NEC

NEC N8406-026 10Gb Intelligent L3 Switch

Command Reference Guide (AOS)

Part number: 856-127950-202-00
First edition: Oct 2008

PN# 456-01798-000

Legal notices

© 2008 NEC Corporation

The information contained herein is subject to change without notice. The only warranties for NEC products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. NEC shall not be liable for technical or editorial errors or omissions contained herein.

Microsoft®, Windows®, and Windows NT® are U.S. registered trademarks of Microsoft Corporation.

SunOS™ and Solaris™ are trademarks of Sun Microsystems, Inc. in the U.S. and other countries.

Cisco® is a registered trademark of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

Part number: 856-127950-202-00

First edition: Oct 2008

Contents

Command line interface
- Introduction 8
- Additional references 8
- Connecting to the switch 8
  - Establishing a console connection 8
  - Setting an IP address 9
  - Establishing a Telnet connection 9
  - Establishing an SSH connection 9
- Accessing the switch 10
- Idle timeout 11
- Typographical conventions 11

Menu basics
- Introduction 13
- Main Menu 13
- Menu summary 13
- Global commands 14
- Command line history and editing 15
- Command line interface shortcuts 16
  - Command stacking 16
  - Command abbreviation 16
  - Tab completion 16

First-time configuration
- Introduction 17
  - Configuring Simple Network Management Protocol support 17
- Setting passwords 18
  - Changing the default administrator password 18
  - Changing the default user password 19
  - Changing the default operator password 20

Information Menu
- Introduction 21
- Menu overview 21
- System Information Menu 22
- SNMPv3 Information Menu 22
  - SNMPv3 USM User Table information 23
  - SNMPv3 View Table information 24
  - SNMPv3 Access Table information 24
  - SNMPv3 Group Table information 25
  - SNMPv3 Community Table information 25
  - SNMPv3 Target Address Table information 25
  - SNMPv3 Target Parameters Table information 26
  - SNMPv3 Notify Table information 26
  - SNMPv3 dump 27
- System information 28
- Show last 100 syslog messages 28
- System user information 29
- Layer 2 information 30
- FDB information menu 31
  - Show all FDB information 31
  - Clearing entries from the FDB 31
- Link Aggregation Control Protocol information 32
  - LACP dump 32
- 802.1x information 33
- Spanning Tree information 34
- Rapid Spanning Tree and Multiple Spanning Tree information 36
- Common Internal Spanning Tree information 38

Trunk group information 39
VLAN information 40
Layer 2 general information 40
Layer 3 information 40
Route information 41
Show all Route information 42
ARP information 43
Show all ARP entry information 43
ARP address list information 43
OSPF information 44
OSPF general information 45
OSPF interface information 45
OSPF Database information 45
OSPF route codes information 47
Routing Information Protocol information 47
RIP Routes information 47
RIP user configuration 47
IP information 48
IGMP multicast group information 48
IGMP multicast router port information 49
VRRP information 49
QoS information 50
802.1p information 50
ACL information 51
RMON Information Menu 51
RMON history information 51
RMON alarm information 52
RMON event information 54
Link status information 54
Port information 55
SFP information 56
1-1 Uplink Failure Detection information 56
Information dump 56

Statistics Menu
Introduction 57
Menu information 57
Port Statistics Menu 57
802.1x statistics 58
Bridging statistics 60
Ethernet statistics 60
Interface statistics 62
Internet Protocol (IP) statistics 63
Link statistics 64
Port RMON statistics 64
Layer 2 statistics 66
FDB statistics 66
LACP statistics 66
Layer 3 statistics 67
GEA Layer 3 statistics menu 68
GEA Layer 3 statistics 68
IP statistics 68
Route statistics 69
ARP statistics 69
DNS statistics 69
ICMP statistics 70
TCP statistics 71
UDP statistics 72
IGMP Multicast Group statistics 72
OSPF statistics menu 73
OSPF global statistics 73
VRRP statistics 76

RIP statistics 77
Management Processor statistics 77
Packet statistics 78
TCP statistics 78
UDP statistics 79
CPU statistics 79
Access Control List (ACL) statistics menu 79
ACL statistics 80
SNMP statistics 80
NTP statistics 82
Uplink Failure Detection (UFD) statistics 83
Statistics dump 83

Configuration Menu
Introduction 84
Menu information 84
Viewing, applying, reverting, and saving changes 84
Viewing pending changes 85
Applying pending changes 85
Reverting changes 85
Saving the configuration 85
Reminders 86
System configuration 86
System host log configuration 87
Secure Shell Server configuration 88
RADIUS server configuration 89
TACACS+ server configuration 90
NTP server configuration 91
System SNMP configuration 92
SNMPv3 configuration 93
User Security Model configuration 94
SNMPv3 View configuration 95
View-based Access Control Model configuration 96
SNMPv3 Group configuration 97
SNMPv3 Community Table configuration 97
SNMPv3 Target Address Table configuration 98
SNMPv3 Target Parameters Table configuration 98
SNMPv3 Notify Table configuration 99
System Access configuration 99
Management Networks configuration 100
User Access Control configuration 101
User ID configuration 101
HTTPS Access configuration 102
Port configuration 103
Temporarily disabling a port 104
Port link configuration 104
Port ACL/QoS configuration 105
Layer 2 configuration 105
802.1x configuration 106
802.1x Global configuration 106
802.1x Port configuration 107
Rapid Spanning Tree Protocol / Multiple Spanning Tree Protocol configuration 109
Common Internal Spanning Tree configuration 110
CIST bridge configuration 110
CIST port configuration 112
Spanning Tree configuration 113
Bridge Spanning Tree configuration 113
Spanning Tree port configuration 114
Forwarding Database configuration 115
Static FDB configuration 115
Trunk configuration 116
IP Trunk Hash configuration 116

Layer 2 IP Trunk Hash configuration 117
Link Aggregation Control Protocol configuration 117
LACP Port configuration 118
VLAN configuration 118
Layer 3 configuration 119
IP interface configuration 120
Default Gateway configuration 120
IP Static Route configuration 121
Address Resolution Protocol configuration 121
Static ARP configuration 122
IP Forwarding configuration 122
Network Filter configuration 123
Route Map configuration 123
IP Access List configuration 124
Routing Information Protocol configuration 124
RIP Interface configuration 125
RIP Route Redistribution configuration 126
Open Shortest Path First configuration 127
OSPF Area Index configuration 128
OSPF Summary Range configuration 129
OSPF Interface configuration 129
OSPF Virtual Link configuration 130
OSPF Host Entry configuration 130
OSPF Route Redistribution configuration 131
OSPF MD5 Key configuration 131
IGMP configuration 132
IGMP snooping configuration 132
IGMPv3 Snooping configuration 133
IGMP static multicast router configuration 134
IGMP filtering configuration 134
IGMP filter definition 134
IGMP filtering port configuration 135
Domain Name System configuration 136
Bootstrap Protocol Relay configuration 136
Virtual Router Redundancy Protocol configuration 137
VRRP Virtual Router configuration 137
VRRP Virtual Router Priority Tracking configuration 139
VRRP Virtual Router Group configuration 140
VRRP Virtual Router Group Priority Tracking configuration 141
VRRP Interface configuration 141
VRRP Tracking configuration 142
Quality of Service configuration 143
QoS 802.1p configuration 143
Access Control configuration 143
Access Control List configuration 145
ACL Ethernet Filter configuration 145
ACL IP Version 4 Filter configuration 146
ACL TCP/UDP Filter configuration 146
ACL Meter configuration 147
ACL Re-mark configuration 148
ACL Re-mark In-Profile configuration 148
ACL Re-mark In-Profile Update User Priority configuration 148
ACL Re-mark Out-of-Profile configuration 149
ACL Packet Format configuration 149
ACL Group configuration 149
Remote Monitoring configuration 150
RMON history configuration 150
RMON event configuration 151
RMON alarm configuration 151
Port mirroring 153
Port-based port mirroring 153

Uplink Failure Detection configuration 154
Failure Detection Pair (FDP) configuration 154
Link to Monitor (LtM) configuration 155
Link to Disable configuration 155
Configuration Dump 156
Saving the active switch configuration 156
Restoring the active switch configuration 156

Operations Menu
Introduction 158
Menu information 158
Operations-level port options 158
Operations-level port 802.1x options 159
Operations-level VRRP options 159

Boot Options Menu
Introduction 160
Menu information 160
Updating the switch software image 160
Downloading new software to the switch 160
Selecting a software image to run 161
Uploading a software image from the switch 162
Selecting a configuration block 162
Resetting the switch 164
Accessing the ISCLI 164

Maintenance Menu
Introduction 165
Menu information 165
System maintenance options 166
Forwarding Database options 166
Debugging options 167
ARP cache options 167
IP Route Manipulation options 168
IGMP Multicast Group options 168
IGMP Snooping options 168
IGMP Mrulticast Routers options 169
Technical support dump 169
FTP/TFTP technical support dump put 169
Uuencode flash dump 169
FTP/TFTP system dump put 170
Clearing dump information 170
Panic command 170
Unscheduled system dumps 171

Command line interface

Introduction

The 10Gb Intelligent L3 Switch is ready to perform basic switching functions right out of the box. Some of the more advanced features, however, require some administrative configuration before they can be used effectively.

The extensive switching software included in the switch provides a variety of options for accessing and configuring the switch:

- Built-in, text-based command line interfaces (AOS CLI and ISCLI) for access via a local terminal or remote Telnet/Secure Shell (SSH) session
- Simple Network Management Protocol (SNMP) support for access through network management software such as NEC WebSAM NetvisorPro
- A browser-based management interface for interactive network access through the Web browser

The command line interface is the most direct method for collecting switch information and performing switch configuration. Using a basic terminal, you can view information and statistics about the switch, and perform any necessary configuration.

This chapter explains how to access the AOS CLI to the switch.

Additional references

Additional information about installing and configuring the switch is available in the following guides, which are attached in this product.

- *N8406-026 10Gb Intelligent L3 Switch User's Guide*
- *N8406-026 10Gb Intelligent L3 Switch Application Guide*
- *N8406-026 10Gb Intelligent L3 Switch Command Reference Guide (ISCLI)*
- *N8406-026 10Gb Intelligent L3 Switch Browser-based Interface Reference Guide*

Connecting to the switch

You can access the command line interface in one of the following ways:

- Using a console connection via the console port
- Using a Telnet connection over the network
- Using a Secure Shell (SSH) connection to securely log in over a network

Establishing a console connection

To establish a console connection with the switch, you need:

- A null modem cable with a female DB-9 connector (See the *N8406-026 10Gb Intelligent L3 Switch User's Guide* for more information.)
- An ASCII terminal or a computer running terminal emulation software set to the parameters shown in the table below

Table 1 Console configuration parameters

Parameter	Value
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

To establish a console connection with the switch:

1. Connect the terminal to the console port using the null modem cable.
2. Power on the terminal.
3. Press the **Enter** key a few times on the terminal to establish the connection.
4. You will be required to enter a password for access to the switch. (For more information, see the "Setting passwords" section in the "First-time configuration" chapter.)

Setting an IP address

To access the switch via a Telnet or an SSH connection, you need to have an Internet Protocol (IP) address set for the switch. The switch can get its IP address in one of the following ways:

- Management port access:
  - Using a Dynamic Host Control Protocol (DHCP) server—When the `/cfg/sys/dhcp` command is `enabled`, the management interface (interface 250) requests its IP address from a DHCP server. The default value for the `/cfg/sys/dhcp` command is `enabled`.
  - Configuring manually—If the network does not support DHCP, you must configure the management interface (interface 256) with an IP address. If you want to access the switch from a remote network, you also must configure the management gateway (gateway 254).
- Uplink port access:
  - Using a Bootstrap Protocol (BOOTP) server—By default, the management interface is set up to request its IP address from a BOOTP server. If you have a BOOTP server on the network, add the Media Access Control (MAC) address of the switch to the BOOTP configuration file located on the BOOTP server. The MAC address can be found in the System Information menu (See the "System information" section in the "Information Menu" chapter.) If you are using a DHCP server that also does BOOTP, you do not have to configure the MAC address.
  - Configuring manually—If the network does not support BOOTP, you must configure the management port with an IP address.

Establishing a Telnet connection

A Telnet connection offers the convenience of accessing the switch from any workstation connected to the network. Telnet provides the same options for user, operator, and administrator access as those available through the console port. By default, Telnet is enabled on the switch. The switch supports four concurrent Telnet connections.

Once the IP parameters are configured, you can access the CLI using a Telnet connection. To establish a Telnet connection with the switch, run the Telnet program on the workstation and enter the **telnet** command, followed by the switch IP address:

```
telnet <10Gb Intelligent L3 Switch IP address>
```

You will then be prompted to enter a password. The password entered determines the access level: administrator, operator, or user. See the "Accessing the switch" section later in this chapter for description of default passwords.

Establishing an SSH connection

Although a remote network administrator can manage the configuration of a switch via Telnet, this method does not provide a secure connection. The Secure Shell (SSH) protocol enables you to securely log into the switch over the network.

As a secure alternative to using Telnet to manage switch configuration, SSH ensures that all data sent over the network is encrypted and secure. In order to use SSH, you must first configure it on the switch. See the "Secure Shell Server configuration" section in the "Configuration Menu" chapter for information on how to configure SSH.

The switch can perform only one session of key/cipher generation at a time. Therefore, an SSH/Secure Copy (SCP) client will not be able to log in if the switch is performing key generation at that time or if another client has just logged in before this client. Similarly, the system will fail to perform the key generation if an SSH/SCP client is logging in at that time.

The supported SSH encryption and authentication methods are listed below.

- Server Host Authentication—Client RSA authenticates the switch in the beginning of every connection
- Key Exchange—RSA
- Encryption:
  - AES256-CBC
  - AES192-CBC
  - AES128-CBC
  - 3DES-CBC
  - 3DES
  - ARCFOUR
- User Authentication—Local password authentication; Remote Authentication Dial-in User Service (RADIUS)

The following SSH clients are supported:

- SSH 3.0.1 for Linux (freeware)
- SecureCRT® 4.1.8 (VanDyke Technologies, Inc.)
- OpenSSH_3.9 for Linux (FC 3)
- SCP commands for Linux (FC3)
- PuTTY Release 0.58 (Simon Tatham) for Windows

NOTE: The switch implementation of SSH is based on versions 1.5 and 2.0, and supports SSH clients from version 1.0 through version 2.0. SSH clients of other versions are not supported. You may configure the client software to use protocol SSH version 1 or version 2.

By default, SSH service is not enabled on the switch. Once the IP parameters are configured, you can access the command line interface to enable SSH.

To establish an SSH connection with the switch, run the SSH program on the workstation by issuing the **ssh** command, followed by the user account name and the switch IP address:

```
>> # ssh <user>@<10Gb Intelligent L3 Switch IP address>
```

You will then be prompted to enter your password.

NOTE: The first time you run SSH from the workstation, a warning message might appear. At the prompt, enter **yes** to continue.

Accessing the switch

To enable better switch management and user accountability, the switch provides different levels or classes of user access. Levels of access to the CLI and Web management functions and screens increase as needed to perform various switch management tasks. The three levels of access are:

- User—User interaction with the switch is completely passive; nothing can be changed on the switch. Users may display information that has no security or privacy implications, such as switch statistics and current operational state information.
- Operator—Operators can only effect temporary changes on the switch. These changes will be lost when the switch is rebooted/reset. Operators have access to the switch management features used for daily switch operations. Because any changes an operator makes are undone by a reset of the switch, operators cannot severely impact switch operation, but do have access to the Maintenance menu.
- Administrator—Only administrators can make permanent changes to the switch configuration, changes that are persistent across a reboot/reset of the switch. Administrators can access switch functions to configure and troubleshoot problems on the switch. Because administrators can also make temporary (operator-level) changes as well, they must be aware of the interactions between temporary and permanent changes.

Access to switch functions is controlled through the use of unique usernames and passwords. Once you are connected to the switch via the local console, Telnet, or SSH, you are prompted to enter a password. The password entered determines the access level. The default user names/password for each access level is listed in the following table.

NOTE: It is recommended that you change default switch passwords after initial configuration and as regularly as required under your network security policies. For more information, see the "Setting passwords" section in the "First-time configuration" chapter.

Table 2 User access levels

User account	Description and tasks performed
User	The user has no direct responsibility for switch management. He or she can view all switch status information and statistics, but cannot make any configuration changes to the switch. The user account is enabled by default, and the default password is `user`.
Oper	The operator manages all functions of the switch. The operator can reset ports or the entire switch. By default, the operator account is disabled and has no password.
Admin	The super user administrator has complete access to all menus, information, and configuration commands on the switch, including the ability to change both the user and administrator passwords. The admin account is enabled by default, and the default password is `admin`.

NOTE: With the exception of the **admin** user, setting the password to an empty value can disable access to each user level.

Once you enter the administrator password and it is verified, you are given complete access to the switch.

After logging in, the Main Menu of the CLI is displayed. See the "Menu basics" chapter for a summary of the Main Menu options.

```
[Main Menu]
      info    - Information Menu
      stats   - Statistics Menu
      cfg     - Configuration Menu
      oper    - Operations Command Menu
      boot    - Boot Options Menu
      maint   - Maintenance Menu
      diff    - Show pending config changes  [global command]
      apply   - Apply pending config changes [global command]
      save    - Save updated config to FLASH [global command]
      revert  - Revert pending or applied changes [global command]
      exit    - Exit  [global command, always available]

>> Main#
```

Idle timeout

By default, the switch will disconnect the console, Telnet, or SSH session after five minutes of inactivity. This function is controlled by the idle timeout parameter, which can be set from 1 to 60 minutes. For information on changing this parameter, see the "System configuration" section in the "Configuration Menu" chapter.

Typographical conventions

The following table describes the typographic styles used in this guide:

Table 3 Typographic conventions

Typeface or symbol	Meaning	Example
`AaBbCc123`	This type depicts onscreen computer output and prompts.	`Main#`
`AaBbCc123`	This type displays in command examples and shows text that must be typed in exactly as shown.	`Main# sys`

Table 3 Typographic conventions

Typeface or symbol	Meaning	Example
<AaBbCc123>	This italicized type displays in command examples as a parameter placeholder. Replace the indicated text with the appropriate real name or value when using the command. Do not type the brackets. This also shows guide titles, special terms, or words to be emphasized.	To establish a Telnet session, enter: `host# telnet <IP address>` Read the user guide thoroughly.
`[ ]`	Command items shown inside brackets are optional and can be used or excluded as the situation demands. Do not type the brackets.	`host# ls [-a]`

Menu basics

Introduction

The AOS CLI is used for viewing switch information and statistics. In addition, the administrator can use the CLI for performing all levels of switch configuration.

To make the CLI easy to use, the various commands have been logically grouped into a series of menus and submenus. Each menu displays a list of commands and/or submenus that are available, along with a summary of what each command will do. Below each menu is a prompt where you can enter any command appropriate to the current menu.

This chapter describes the Main Menu commands, and provides a list of commands and shortcuts that are commonly available from all the menus within the CLI.

Main Menu

The Main Menu displays after a successful connection and login. The following table shows the Main Menu for the administrator login. Some features are not available under the user login.

```
[Main Menu]
      info    - Information Menu
      stats   - Statistics Menu
      cfg     - Configuration Menu
      oper    - Operations Command Menu
      boot    - Boot Options Menu
      maint   - Maintenance Menu
      diff    - Show pending config changes  [global command]
      apply   - Apply pending config changes [global command]
      save    - Save updated config to FLASH [global command]
      revert  - Revert pending or applied changes [global command]
      exit    - Exit  [global command, always available]
```

Menu summary

The Main Menu displays the following submenus:

- Information Menu

  The Information Menu provides submenus for displaying information about the current status of the switch: from basic system settings to VLANs, and more.

- Statistics Menu

  This menu provides submenus for displaying switch performance statistics. Included are port, IP, ICMP, TCP, UDP, SNMP, routing, ARP, and DNS.

- Configuration Menu

  It includes submenus for configuring every aspect of the switch. Changes to configuration are not active until explicitly applied. Changes can be saved to non-volatile memory (NVRAM).

- Operations Command Menu

  Operations-level commands are used for making immediate and temporary changes to switch configuration. This menu is used for bringing ports temporarily in and out of service.

- Boot Options Menu

  This menu is used for upgrading switch software, selecting configuration blocks, and for resetting the switch when necessary. This menu is also used to set the switch back to factory settings.

- Maintenance Menu

  This menu is used for debugging purposes, enabling you to generate a technical support dump of the critical state information in the switch, and to clear entries in the Forwarding Database and the Address Resolution Protocol (ARP) and routing tables.

Global commands

Some basic commands are recognized throughout the menu hierarchy. These commands are useful for obtaining online Help, navigating through menus, and for applying and saving configuration changes.

For help on a specific command, type help. The following screen displays:

```
>> Main# help
For help on a specific command, type help <command>


Global Commands: [can be issued from any menu]
help              up                print             pwd
lines             verbose           exit              quit
diff              apply             save              revert
ping              traceroute        telnet            history
pushd             popd              who

The following are used to navigate the menu structure:
   .  Print current menu
  ..  Move up one menu level
   /  Top menu if first, or command separator
   !  Execute command from history
```

The following table describes the global commands.

Table 4 Global commands

Command	Action
`? or help`	Provides usage information about a specific command on the current menu. When used without the command parameter, a summary of the global commands is displayed.
`. or print`	Displays the current menu.
`.. or up`	Moves up one level in the menu structure.
`/`	If placed at the beginning of a command, displays the Main Menu. Otherwise, this is used to separate multiple commands placed on the same line.
`lines`	Sets the number of lines (n) that display on the screen at one time. The default is 24 lines. When used without a value, the current setting is displayed.
`diff`	Shows any pending configuration changes that have not been applied. `diff flash` displays all pending configuration changes that have been applied but not saved to flash memory (NVRAM), as well as those that have not been applied.
`apply`	Applies pending configuration changes.
`save`	Saves the active configuration to backup, and saves the current configuration as active. `Save n` saves the current configuration as active, without saving the active configuration to backup.
`revert`	Removes changes that have been made, but not applied. `Revert apply` removes all changes that have not been saved.
`exit or quit`	Exits from the command line interface and logs out.
`ping`	Verifies station-to-station connectivity across the network. The format is: `ping <host name> | <IP address> [ <number of tries> [ <msec delay> ]] [-m|-mgt|-d|-data]` • IP address is the hostname or IP address of the device. • number of tries (optional) is the number of attempts (1-32). • msec delay (optional) is the number of milliseconds between attempts.
`traceroute`	Identifies the route used for station-to-station connectivity across the network. The format is: `traceroute <host name> | <IP address> [<max-hops> [ <msec delay> ]]` • IP address is the hostname or IP address of the target station. • max-hops (optional) is the maximum distance to trace (1-16 devices) • msec delay (optional) is the number of milliseconds to wait for the response.
`pwd`	Displays the command path used to reach the current menu.

Table 4 Global commands

Command	Action
`verbose n`	Sets the level of information displayed on the screen: • 0 = Quiet: Nothing displays except errors, not even prompts. • 1 = Normal: Prompts and requested output are shown, but no menus. • 2 = Verbose: Everything is shown. This is the default. • When used without a value, the current setting is displayed.
`telnet`	This command is used to Telnet out of the switch. The format is: `telnet <hostname> | <IP address> [port]`
`history`	Displays the history of the last ten commands.
`pushd`	Remembers the current location in the directory of menu commands.
`popd`	Returns to the last pushd location.
`who`	Displays users who are logged in.

Command line history and editing

Using the command line interface, you can retrieve and modify previously entered commands with just a few keystrokes. The following options are available globally at the command line:

Table 5 Command line history and editing options

Option	Description
`history`	Displays a numbered list of the last ten previously entered commands.
`!!`	Repeats the last entered command.
`!n`	Repeats the nth command shown on the history list.
`<Ctrl-p>` or Up arrow key	Recalls the previous command from the history list. This can be used multiple times to work backward through the last ten commands. The recalled command can be entered as is, or edited using the options below.
`<Ctrl-n>` or Down arrow key	Recalls the next command from the history list. This can be used multiple times to work forward through the last ten commands. The recalled command can be entered as is, or edited using the options below.
`<Ctrl-a>`	Moves the cursor to the beginning of the command line.
`<Ctrl-e>`	Moves the cursor to the end of the command line.
`<Ctrl-b>` or Left arrow key	Moves the cursor back one position to the left.
`<Ctrl-f>` or Right arrow key	Moves the cursor forward one position to the right.
`<Backspace>` or Delete key	Erases one character to the left of the cursor position.
`<Ctrl-d>`	Deletes one character at the cursor position.
`<Ctrl-k>`	Erases all characters from the cursor position to the end of the command line.
`<Ctrl-l>`	Redisplays the current line.
`<Ctrl-u>`	Clears the entire line.
Other keys	Inserts new characters at the cursor position.
`.`	Prints the current level menu list.
`..`	Moves to the previous directory level.

Command line interface shortcuts

The following shortcuts allow you to enter commands quickly and easily.

Command stacking

As a shortcut, you can type multiple commands on a single line, separated by forward slashes (/). You can connect as many commands as required to access the menu option that you want.

For example, the keyboard shortcut to access the Simple Network Management Protocol (SNMP) Configuration Menu from the Main# prompt is:

```
Main# cfg/sys/ssnmp/name
```

Command abbreviation

Most commands can be abbreviated by entering the first characters that distinguish the command from the others in the same menu or submenu.

For example, the command shown above could also be entered as:

```
Main# c/sys/ssn/n
```

Tab completion

By entering the first letter of a command at any menu prompt and pressing the Tab key, the CLI will display all commands or options in that menu that begin with that letter. Entering additional letters will further refine the list of commands or options displayed.

If only one command fits the input text when the Tab key is pressed, that command will be supplied on the command line, waiting to be entered. If the Tab key is pressed without any input on the command line, the currently active menu displays.

First-time configuration

Introduction

This chapter describes how to perform first-time configuration and how to change system passwords.

To begin first-time configuration of the switch, perform the following steps.

1. Connect to the switch console. After connecting, the login prompt displays.

```
 Blade Network Technologies 10Gb Intelligent L3 Switch.

 Enter password:
```

2. Enter `admin` as the default administrator password.
   The system displays the Main Menu with administrator privileges.

```
[Main Menu]
   info    - Information Menu
   stats   - Statistics Menu
   cfg     - Configuration Menu
   oper    - Operations Command Menu
   boot    - Boot Options Menu
   maint   - Maintenance Menu
   diff    - Show pending config changes  [global command]
   apply   - Apply pending config changes [global command]
   save    - Save updated config to FLASH [global command]
   revert  - Revert pending or applied changes [global command]
   exit    - Exit  [global command, always available]

>> Main#
```

3. From the Main Menu, enter the following command to access the Configuration Menu:

```
Main# /cfg
```

   The Configuration Menu is displayed.

```
[Configuration Menu]
     sys       - System-wide Parameter Menu
     port      - Port Menu
     l2        - Layer 2 Menu
     l3        - Layer 3 Menu
     qos       - QOS Menu
     acl       - Access Control List Menu
     rmon      - RMON Menu
     pmirr     - Port Mirroring Menu
     ufd       - Uplink Failure Detection Menu
     dump      - Dump current configuration to script file
     ptcfg     - Backup current configuration to FTP/TFTP server
     gtcfg     - Restore current configuration from FTP/TFTP server
     cur       - Display current configuration

>> Configuration#
```

Configuring Simple Network Management Protocol support

NOTE: SNMP support is enabled by default.

1. Use the following command to enable SNMP:

```
>> # /cfg/sys/access/snmp disable|read only|read/write
```

2. Set SNMP read or write community string. By default, they are public and private respectively:

```
>> # /cfg/sys/ssnmp/rcomm|wcomm
```

3. When prompted, enter the proper community string.

4. Apply and save configuration .

```
>> System# apply

>> System# save
```

Setting passwords

NEC recommends that you change all passwords after initial configuration and as regularly as required under the network security policies. See the "Accessing the switch" section in the "Command line interface" chapter for a description of the user access levels.

To change the user, operator, or administrator password, you must log in using the administrator password. Passwords cannot be modified from the user or operator command mode.

NOTE: You must not forget your administrator password. If you forget your administrator password, contact your service representative.

Changing the default administrator password

The administrator has complete access to all menus, information, and configuration commands, including the ability to change the user, operator, and administrator passwords.

The default password for the administrator account is admin. To change the default password:

1. Connect to the switch and log in using the `admin` password.
2. From the Main Menu, use the following command to access the Configuration Menu:

```
Main# /cfg
```

The Configuration Menu is displayed.

```
[Configuration Menu]
     sys      - System-wide Parameter Menu
     port     - Port Menu
     l2       - Layer 2 Menu
     l3       - Layer 3 Menu
     qos      - QOS Menu
     acl      - Access Control List Menu
     rmon     - RMON Menu
     pmirr    - Port Mirroring Menu
     ufd      - Uplink Failure Detection Menu
     dump     - Dump current configuration to script file
     ptcfg    - Backup current configuration to FTP/TFTP server
     gtcfg    - Restore current configuration from FTP/TFTP server
     cur      - Display current system access configuration

>> Configuration#
```

3. From the Configuration Menu, use the following command to select the System Menu:

```
>> Configuration# sys
```

The System Menu is displayed.

```
[System Menu]
     syslog   - Syslog Menu
     sshd     - SSH Server Menu
     radius   - RADIUS Authentication Menu
     tacacs+  - TACACS+ Authentication Menu
     ntp      - NTP Server Menu
     ssnmp    - System SNMP Menu
     access   - System Access Menu
     date     - Set system date
     time     - Set system time
     timezone - Set system timezone
     olddst   - Set system DST for US
     dlight   - Set system daylight savings
     idle     - Set timeout for idle CLI sessions
     notice   - Set login notice
     bannr    - Set login banner
     hprompt  - Enable/disable display hostname (sysName) in CLI prompt
     bootp    - Enable/disable use of BOOTP
     dhcp     - Enable/disable use of DHCP on Mgmt interface
     reminder - Enable/disable Reminders
     cur      - Display current system-wide parameters
```

4. Enter the following command to set the administrator password:

```
System# access/user/admpw
```

5. Enter the current administrator password at the prompt:

```
Changing ADMINISTRATOR password; validation required:

Enter current admin password:
```

NOTE: You must not forget your administrator password. If you forget your administrator password, contact your service representative.

6. Enter the new administrator password at the prompt:

```
Enter new administrator password (max 128 characters):
```

7. Enter the new administrator password, again, at the prompt:

```
Re-enter new admin password:
```

8. Apply and save the change by entering the following commands:

```
System# apply
System# save
```

Changing the default user password

The user login has limited control of the switch. Through a user account, you can view switch information and statistics, but you cannot make configuration changes.

The default password for the user account is user. This password cannot be changed from the user account. Only the administrator has the ability to change passwords, as shown in the following procedure.

1. Connect to the switch and log in using the admin password.
2. From the Main Menu, use the following command to access the Configuration Menu:

```
Main# cfg
```

3. From the Configuration Menu, use the following command to select the System Menu:

```
>> Configuration# sys
```

4. Enter the following command to set the user password:

```
System# access/user/usrpw
```

5. Enter the current administrator password at the prompt.

   Only the administrator can change the user password. Entering the administrator password confirms your authority.

```
Changing USER password; validation required:

Enter current admin password:
```

6. Enter the new user password at the prompt:

```
Enter new user password (max 128 characters):
```

7. Enter the new user password, again, at the prompt:

```
Re-enter new user password:
```

8. Apply and save the changes:.

```
System# apply
System# save
```

Changing the default operator password

The operator manages all functions of the switch. The operator can reset ports or the entire switch. Operators can only effect temporary changes on the switch. These changes will be lost when the switch is rebooted/reset. Operators have access to the switch management features used for daily switch operations. Because any changes an operator makes are undone by a reset of the switch, operators cannot severely impact switch operation.

By default, the operator account is disabled and has no password. This password cannot be changed from the operator account. Only the administrator has the ability to change passwords, as shown in the following procedure.

1. Connect to the switch and log in using the admin password.
2. From the Main Menu, use the following command to access the Configuration Menu:

```
Main# cfg
```

3. From the Configuration Menu, use the following command to select the System Menu:

```
>> Configuration# sys
```

4. Enter the following command to set the operator password:

```
System# access/user/opw
```

5. Enter the current administrator password at the prompt.

   Only the administrator can change the user password. Entering the administrator password confirms your authority.

```
Changing OPERATOR password; validation required:
Enter current admin password:
```

6. Enter the new operator password at the prompt:

```
Enter new operator password (max 128 characters):
```

7. Enter the new operator password, again, at the prompt:

```
Re-enter new operator password:
```

8. Apply and save the changes:

```
System# apply
System# save
```

Information Menu

Introduction

You can view configuration information for the switch in the user, operator, and administrator command modes. This chapter discusses how to use the CLI to display switch information.

Menu overview

Command: `/info`

```
[Information Menu]
     sys      - System Information Menu
     l2       - Layer 2 Information Menu
     l3       - Layer 3 Information Menu
     qos      - QOS Menu
     acl      - Show ACL information
     rmon     - Show RMON information
     link     - Show link status
     port     - Show port information
     sfp      - Show External Port SFP/XFP status
     ufd      - Show Uplink Failure Detection information
     dump     - Dump all information
```

The following table describes the Information Menu options.

Table 6 Information Menu options

Command	Usage
`sys`	Displays system information.
`l2`	Displays the Layer 2 Information Menu.
`l3`	Displays the Layer 3 Information Menu.
`qos`	Displays the Quality of Service (QoS) Information Menu.
`acl`	Displays the Access Control List (ACL) Information Menu.
`rmon`	Displays the Remote Monitoring Information Menu.
`link`	Displays configuration information about each port, including: • Port number • Port speed (10 Mb/s, 100 Mb/s, or auto) • Duplex mode (half, full, or any) • Flow control for transmit and receive (no, yes, or any) • Link status (up or down)
`port`	Displays port status information, including: • Port number • Whether the port uses VLAN tagging or not • Port VLAN ID (PVID) • Port name • VLAN membership
`sfp`	Displays SFP module information.
`ufd`	Displays (UFD) Uplink Failure Detection information
`dump`	Dumps all switch information available from the Information Menu (10K or more, depending on your configuration).

System Information Menu

Command: `/info/sys`

```
[System Menu]
     snmpv3   - SNMPv3 Information Menu
     general  - Show general system information
     log      - Show last 100 syslog messages
     user     - Show current user status
     dump     - Dump all system information
```

The following table describes the System Information Menu options.

Table 7 System Information Menu options

Command	Usage
`snmpv3`	Displays the SNMP v3 Menu.
`general`	Displays system information, including: • System date and time • Switch model name and number • Switch name and location • Time of last boot • MAC address of the switch management processor • IP address of IP interface • Hardware version and part number • Software image file and version number • Configuration name • Log-in banner, if one is configured
`log`	Displays most recent syslog messages.
`user`	Displays the User Access Information Menu.
`dump`	Dumps all switch information available from the Information Menu (10K or more, depending on your configuration).

SNMPv3 Information Menu

Command: `/info/sys/snmpv3`

```
[SNMPv3 Information Menu]
     usm      - Show usmUser table information
     view     - Show vacmViewTreeFamily table information
     access   - Show vacmAccess table information
     group    - Show vacmSecurityToGroup table information
     comm     - Show community table information
     taddr    - Show targetAddr table information
     tparam   - Show targetParams table information
     notify   - Show notify table information
     dump     - Show all SNMPv3 information
```

SNMP version 3 (SNMPv3) is an extensible SNMP Framework that supplements the SNMPv2 Framework by supporting the following:

- a new SNMP message format
- security for messages
- access control
- remote configuration of SNMP parameters

For more details on the SNMPv3 architecture, see RFC2271 to RFC2276.

The following table describes the SNMPv3 Information Menu options.

Table 8 SNMPv3 Information Menu options

Command	Usage
usm	Displays User Security Model (USM) table information.
view	Displays information about view name, subtrees, mask and type of view.
access	Displays View-based Access Control information.
group	Displays information about the group that includes the security model, user name, and group name.
comm	Displays information about the community table.
taddr	Displays the Target Address table.
tparam	Displays the Target parameters table.
notify	Displays the Notify table.
dump	Displays all the SNMPv3 information.

SNMPv3 USM User Table information

Command: `/info/sys/snmpv3/usm`

```
usmUser Table:
User Name                       Protocol
------------------------------- --------------------------------
adminmd5                        HMAC_MD5, DES PRIVACY
adminsha                        HMAC_SHA, DES PRIVACY
v1v2only                        NO AUTH,  NO PRIVACY
```

The User-based Security Model (USM) in SNMPv3 provides security services such as authentication and privacy of messages. This security model makes use of a defined set of user identities displayed in the USM user table. The USM user table contains information like:

- the user name
- a security name in the form of a string whose format is independent of the Security Model
- an authentication protocol, which is an indication that the messages sent on behalf of the user can be authenticated
- the privacy protocol.

The following table describes the SNMPv3 User Table information.

Table 9 SNMPv3 User Table parameters

Field	Description
User Name	This is a string that represents the name of the user that you can use to access the switch.
Protocol	This indicates whether messages sent on behalf of this user are protected from disclosure using a privacy protocol. The switch software supports DES algorithm for privacy. The software also supports two authentication algorithms: MD5 and HMAC-SHA.

SNMPv3 View Table information

Command: `/info/sys/snmpv3/view`

```
View Name          Subtree                          Mask           Type
------------------ -------------------------------  -------------  --------
iso                  1                                            included
v1v2only             1                                            included
v1v2only             1.3.6.1.6.3.15                               excluded
v1v2only             1.3.6.1.6.3.16                               excluded
v1v2only             1.3.6.1.6.3.18                               excluded
```

The user can control and restrict the access allowed to a group to only a subset of the management information in the management domain that the group can access within each context by specifying the group's rights in terms of a particular MIB view for security reasons.

The following table describes the SNMPv3 View Table information.

Table 10 SNMPv3 View Table parameters

Field	Description
`View Name`	Displays the name of the view.
`Subtree`	Displays the MIB subtree as an OID string. A view subtree is the set of all MIB object instances which have a common Object Identifier prefix to their names.
`Mask`	Displays the bit mask.
`Type`	Displays whether a family of view subtrees is included or excluded from the MIB view.

SNMPv3 Access Table information

Command: `/info/sys/snmpv3/access`

```
Group Name  Model   Level         ReadV     WriteV   NotifyV
----------  ------- ------------ --------- -------- -------
v1v2grp     snmpv1  noAuthNoPriv iso         iso     v1v2only
admingrp    usm     authPriv     iso         iso     iso
```

The vacmAccessTable (View-based Access Control Model Access Table) maps a group name, security information, and a message type, which could be the read or write type of operation or notification into a MIB view.

This group's access rights are determined by a Read View, a Write View, and a Notify View. The Read View represents the set of object instances authorized for the group while reading the objects. The Write View represents the set of object instances authorized for the group when writing objects. The Notify View represents the set of object instances authorized for the group when sending a notification.

The following table describes the SNMPv3 Access Table information.

Table 11 SNMPv3 Access Table parameters

Field	Description
Group Name	Displays the name of group.
Model	Displays the security model used, for example, SNMPv1, or SNMPv2 or USM.
Level	Displays the minimum level of security required to gain rights of access. For example, noAuthNoPriv, authNoPriv, or auth-Priv.
ReadV	Displays the MIB view to which this entry authorizes the Read access.
WriteV	Displays the MIB view to which this entry authorizes the Write access.
NotifyV	Displays the MIB view to which this entry authorizes the Notify access.

SNMPv3 Group Table information

Command: `/info/sys/snmpv3/group`

```
Sec Model  User Name                      Group Name
---------- ------------------------------ --------------------------------
snmpv1     v1v2only                       v1v2grp
usm        adminmd5                       admingrp
usm        adminsha                       admingrp
```

A group is a combination of security model and security name that defines the access rights assigned to all the security names belonging to that group. The group is identified by a group name.

The following table describes the SNMPv3 Group Table information.

Table 12 SNMPv3 Group Table parameters

Field	Description
Sec Model	Displays the security model used, which is any one of: USM, SNMPv1, SNMPv2, and SNMPv3.
User Name	Displays the name for the user.
Group Name	Displays the access name of the group.

SNMPv3 Community Table information

Command: `/info/sys/snmpv3/comm`

```
Index      Name       User Name            Tag
---------- ---------- -------------------- ----------
trap1      public     v1v2only             v1v2trap
```

This command displays the community table information stored in the SNMP engine.

The following table describes the SNMPv3 Community Table information.

Table 13 SNMPv3 Community Table parameters

Field	Description
Index	Displays the unique index value of a row in this table.
Name	Displays the community string.
User Name	Displays the User Security Model (USM) user name.
Tag	Displays the community tag.

SNMPv3 Target Address Table information

Command: `/info/sys/snmpv3/taddr`

```
Name       Transport Addr  Port Taglist    Params
---------- --------------- ---- ---------- ---------------
trap1      47.81.25.66     162  v1v2trap   v1v2param
```

This command displays the SNMPv3 target address table information.

The following table describes the SNMPv3 Target Address Table information.

Table 14 SNMPv3 Target Address Table parameters

Field	Description
Name	Displays the locally arbitrary, but unique identifier associated with this snmp TargetAddrEntry.
Transport Addr	Displays the transport addresses.
Port	Displays the SNMP UDP port number.
Taglist	This column contains a list of tag values which are used to select target addresses for a particular SNMP message.
Params	The value of this object identifies an entry in the snmpTargetParamsTable. The identified entry contains SNMP parameters to be used when generating messages to be sent to this transport address.

SNMPv3 Target Parameters Table information

Command: `/info/sys/snmpv3/tparam`

```
Name                MP Model User Name            Sec Model Sec Level
------------------- -------- -------------------- --------- -----------
v1v2param           snmpv2c  v1v2only             snmpv1    noAuthNoPriv
```

The following table describes the SNMPv3 Target Parameters Table information.

Table 15 SNMPv3 Target Parameters Table

Field	Description
Name	Displays the locally arbitrary, but unique identifier associated with this snmpTargeParamsEntry.
MP Model	Displays the Message Processing Model used when generating SNMP messages using this entry.
User Name	Displays the securityName, which identifies the entry on whose behalf SNMP messages will be generated using this entry.
Sec Model	Displays the security model used when generating SNMP messages using this entry.
Sec Level	Displays the level of security used when generating SNMP messages using this entry.

SNMPv3 Notify Table information

Command: `/info/sys/snmpv3/notify`

```
Name                Tag
------------------- -------------------
v1v2trap            v1v2trap
```

The following table describes the SNMPv3 Notify Table information.

Table 16 SNMPv3 Notify Table

Field	Description
Name	The locally arbitrary, but unique identifier associated with this snmpNotifyEntry.
Tag	This represents a single tag value which is used to select entries in the `snmpTargetAddrTable`. Any entry in the `snmpTargetAddrTable` that contains a tag value equal to the value of this entry is selected. If this entry contains a value of zero length, no entries are selected.

SNMPv3 dump

Command: `/info/sys/snmpv3/dump`

```
Engine ID = 80:00:07:50:03:00:17:EF:EB:B0:00
usmUser Table:
User Name                       Protocol
------------------------------- -------------------------------
adminmd5                        HMAC_MD5, DES PRIVACY
adminsha                        HMAC_SHA, DES PRIVACY
v1v2only                        NO AUTH, NO PRIVACY

vacmAccess Table:
Group Name Model   Level        ReadV   WriteV   NotifyV
---------- ------- ------------ ------- -------- ------
v1v2grp    snmpv1  noAuthNoPriv iso     iso      v1v2only
admingrp   usm     authPriv     iso     iso      iso

vacmViewTreeFamily Table:
View Name            Subtree         Mask         Type
-------------------- --------------- ------------ --------------
iso                  1                            included
v1v2only             1                            included
v1v2only             1.3.6.1.6.3.15               excluded
v1v2only             1.3.6.1.6.3.16               excluded
v1v2only             1.3.6.1.6.3.18               excluded

vacmSecurityToGroup Table:
Sec Model  User Name                       Group Name
---------- ------------------------------ ------------------------
snmpv1     v1v2only                       v1v2grp
usm        adminmd5                       admingrp
usm        adminsha                       admingrp

snmpCommunity Table:
Index      Name       User Name            Tag
---------- ---------- -------------------- ----------

snmpNotify Table:
Name                 Tag
-------------------- --------------------

snmpTargetAddr Table:
Name       Transport Addr  Port Taglist    Params
---------- --------------- ---- ---------- ---------------

snmpTargetParams Table:
Name                 MP Model User Name          Sec Model Sec Level
-------------------- -------- ------------------ --------- -------
```

System information

Command: `/info/sys/gen`

```
System Information at  16:06:28 Tue Mar  4, 2008
Time zone: Asia/Tokyo
Daylight Savings Time Status: Disabled

Blade Network Technologies 10Gb Intelligent L3 Switch
sysName: Groly
sysLocation:
RackName: emfw-rack
EnclosureName: Default_Chassis_Name
BayNumber:  7
System temperature: 42.5C

Switch has been up for 7 days, 19 hours, 51 minutes and 47 seconds.
Last boot: 17:25:38 Mon Jan 8, 2006 (reset from console)

MAC address: 00:17:ef:eb:b0:00    IP (If 1) address: 193.168.9.100
Management Port MAC Address: 00:17:ef:eb:b0:01
Management Port IP Address (if 250): 192.168.12.90
Revision: 0A
Switch Serial No: USP742000TC
Spare Part No: 856-850991-026-A
Software Version 1.0.0 (FLASH image1), active configuration.
```

System information includes:

- System date and time
- Switch model name and number
- Rack name and location
- Time of last boot
- MAC address of the switch management processor
- IP address of the switch
- Software image file and version number
- Current configuration block (active, backup, or factory default)
- Login banner, if one is configured

Show last 100 syslog messages

Command: `/info/sys/log`

```
Jul 8 17:25:41            NOTICE            system: link up on port 1
Jul 8 17:25:41            NOTICE            system: link up on port 8
Jul 8 17:25:41            NOTICE            system: link up on port 7
Jul 8 17:25:41            NOTICE            system: link up on port 12
Jul 8 17:25:41            NOTICE            system: link up on port 11
Jul 8 17:25:41            NOTICE            system: link up on port 14
Jul 8 17:25:41            NOTICE            system: link up on port 13
Jul 8 17:25:41            NOTICE            system: link up on port 16
Jul 8 17:25:41            NOTICE            system: link up on port 15
Jul 8 17:25:41            NOTICE            system: link up on port 17
Jul 8 17:25:41            NOTICE            system: link up on port 20
Jul 8 17:25:41            NOTICE            system: link up on port 22
Jul 8 17:25:41            NOTICE            system: link up on port 23
Jul 8 17:25:41            NOTICE            system: link up on port 21
Jul 8 17:25:42            NOTICE            system: link up on port 4
Jul 8 17:25:42            NOTICE            system: link up on port 3
Jul 8 17:25:42            NOTICE            system: link up on port 6
Jul 8 17:25:42            NOTICE            system: link up on port 5
Jul 8 17:25:42            NOTICE            system: link up on port 10
Jul 8 17:25:42            NOTICE            system: link up on port 9
```

Each message contains a date and time field and has a severity level associated with it. One of eight different prefixes is used to indicate the condition:

- EMERG—indicates the system is unusable
- ALERT—indicates action should be taken immediately
- CRIT—indicates critical conditions
- ERR—indicates error conditions or eroded operations
- WARNING—indicates warning conditions
- NOTICE—indicates a normal but significant condition
- INFO—indicates an information message
- DEBUG—indicates a debug-level message

System user information

Command: `/info/sys/user`

```
Usernames:
  user     - enabled    - offline
  oper     - disabled   - offline
  admin    - Always Enabled - online     1 session.
Current User ID table:
  1: name Kiku    , ena, cos user    , password valid, offline
```

The following table describes the User Name information.

Table 17 User Name Information menu

Field	Usage
`user`	Displays the status of the `user` access level.
`oper`	Displays the status of the `oper` (operator) access level.
`admin`	Displays the status of the `admin` (administrator) access level.
`Current User ID Table`	Displays the status of configured User ID.

Layer 2 information

Command: `/info/l2`

```
[Layer 2 Menu]
     fdb      - Forwarding Database Information Menu
     lacp     - Link Aggregation Control Protocol Menu
     8021x    - Show 802.1x information
     stp      - Show STP information
     cist     - Show CIST information
     trunk    - Show Trunk Group information
     vlan     - Show VLAN information
     gen      - Show general information
     dump     - Dump all layer 2 information
```

The following table describes the Layer 2 Information menu options.

Table 18 Layer 2 information menu options

Command	Usage
`fdb`	Displays the Forwarding Database Information Menu.
`lacp`	Displays the Link Aggregation Control Protocol Information Menu.
`8021x`	Displays the 802.1x Information Menu.
`stp`	In addition to seeing if STP is enabled or disabled, you can view the following STP bridge information: • Priority • Hello interval • Maximum age value • Forwarding delay • Aging time You can also refer to the following port-specific STP information: • Port number and priority • Cost • State
`cist`	Displays Common internal Spanning Tree (CIST) bridge information, including the following: • Priority • Hello interval • Maximum age value • Forwarding delay You can also view port-specific CIST information, including the following: • Port number and priority • Cost • State
`trunk`	When trunk groups are configured, you can view the state of each port in the various trunk groups.
`vlan`	Displays VLAN configuration information, including: • VLAN Number • VLAN Name • Status • Port membership of the VLAN
`gen`	Displays general Layer 2 configuration information.
`dump`	Dumps all switch information available from the Layer 2 menu (10K or more, depending on your configuration).

FDB information menu

Command: `/info/l2/fdb`

```
[Forwarding Database Menu]
      find    - Show a single FDB entry by MAC address
      port    - Show FDB entries on a single port
      vlan    - Show FDB entries on a single VLAN
      state   - Show FDB entries by state
      dump    - Show all FDB entries
```

The forwarding database (FDB) contains information that maps the media access control (MAC) address of each known device to the switch port where the device address was learned. The FDB also shows which other ports have seen frames destined for a particular MAC address.

NOTE: The master forwarding database supports up to 8K MAC address entries on the management processor (MP) per switch.

Table 19 FDB information menu

Command	Usage
`find <MAC address> [<VLAN>]`	Displays a single database entry by its MAC address. You are prompted to enter the MAC address of the device. Enter the MAC address using the format: xx:xx:xx:xx:xx:xx. (For example: 08:00:20:12:34:56) You can also enter the MAC address using the format: xxxxxxxxxxxx. (For example: 080020123456)
`port <port number>`	Displays all FDB entries for a particular port.
`vlan <1-4094>`	Displays all FDB entries on a single VLAN. The range is 1-4094.
`state unknown|ignore|forward|flood|trunk|ifmac`	Displays all FDB entries that match a particular state.
`dump`	Displays all entries in the Forwarding Database.

Show all FDB information

Command: `/info/l2/fdb/dump`

```
   MAC address      VLAN   Port   Trnk   State
-----------------   ----   ----   ----   -----
00:02:01:00:00:00    300           1     TRK
00:02:01:00:00:01    300    23           FWD
00:02:01:00:00:02    300    23           FWD
00:02:01:00:00:03    300    23           FWD
00:02:01:00:00:04    300    23           FWD
00:02:01:00:00:05    300    23           FWD
00:02:01:00:00:06    300    23           FWD
00:02:01:00:00:07    300    23           FWD
00:02:01:00:00:08    300    23           FWD
00:02:01:00:00:09    300    23           FWD
00:02:01:00:00:0a    300    23           FWD
00:02:01:00:00:0b    300    23           FWD
00:02:01:00:00:0c    300    23           FWD
```

An address that is in the forwarding (FWD) state indicates that the switch has learned it. When in the trunking (TRK) state, the **Trnk** field displays the trunk group number. If the state for the port is listed as unknown (UNK), the MAC address has not yet been learned by the switch, but has only been seen as a destination address. When an address is in the unknown state, no outbound port is indicated.

Clearing entries from the FDB

To delete a static MAC address from the forwarding database (FDB), see the "Static FDB configuration" section in the "Configuration Menu" chapter. To clear the entire forwarding database (FDB), see the "FDB options" section in the "Maintenance Menu" chapter.

Link Aggregation Control Protocol information

Command: `/info/l2/lacp`

```
[LACP Menu]
     aggr     - Show LACP aggregator information for the port
     port     - Show LACP port information
     dump     - Show all LACP ports information
```

The following table describes the Link Aggregation Control Protocol Menu options.

Table 20 LACP information

Command	Usage
`aggr`	Displays LACP aggregator information for the port.
`port`	Displays LACP information for the port.
`dump`	Displays all LACP information parameters.

LACP dump

Command: `/info/l2/lacp/dump`

```
>> LACP# dump
port  lacp      adminkey  operkey  selected    prio    attached  trunk
                                                          aggr
------------------------------------------------------------------------
   1  off             1        1         n    32768        --     --
   2  off             2        2         n    32768        --     --
   3  off             3        3         n    32768        --     --
   4  off             4        4         n    32768        --     --
   5  off             5        5         n    32768        --     --
   6  off             6        6         n    32768        --     --
   7  off             7        7         n    32768        --     --
   8  off             8        8         n    32768        --     --
```

LACP dump includes the following information for each port in the switch:

- port– Displays the port number.
- lacp—Displays the port's LACP mode (active, passive, or off)
- adminkey—Displays the value of the port's adminkey.
- operkey—Shows the value of the port's operational key.
- selected—Indicates whether the port has been selected to be part of a Link Aggregation Group.
- prio—Shows the value of the port priority.
- attached aggr—Displays the aggregator associated with each port.
- trunk—This value represents the LACP trunk group number.

802.1x information

Command: `/info/l2/8021x`

```
System capability : Authenticator
System status     : disabled
Protocol version  : 1
                                      Authenticator    Backend
Port   Auth Mode    Auth Status     PAE State     Auth State
----  ------------  ------------  --------------  ----------
*1    force-auth    unauthorized  initialize      initialize
*2    force-auth    unauthorized  initialize      initialize
*3    force-auth    unauthorized  initialize      initialize
*4    force-auth    unauthorized  initialize      initialize
*5    force-auth    unauthorized  initialize      initialize
*6    force-auth    unauthorized  initialize      initialize
*7    force-auth    unauthorized  initialize      initialize
*8    force-auth    unauthorized  initialize      initialize
*9    force-auth    unauthorized  initialize      initialize
*10   force-auth    unauthorized  initialize      initialize
*11   force-auth    unauthorized  initialize      initialize
*12   force-auth    unauthorized  initialize      initialize
*13   force-auth    unauthorized  initialize      initialize
*14   force-auth    unauthorized  initialize      initialize
*15   force-auth    unauthorized  initialize      initialize
*16   force-auth    unauthorized  initialize      initialize
*17   force-auth    unauthorized  initialize      initialize
*18   force-auth    unauthorized  initialize      initialize
*19   force-auth    unauthorized  initialize      initialize
*20   force-auth    unauthorized  initialize      initialize
*21   force-auth    unauthorized  initialize      initialize
------------------------------------------------------------------
* - Port down or disabled
```

The following table describes the IEEE 802.1x parameters.

Table 21 802.1x information

Field	Description
Port	Displays each port's name.
Auth Mode	Displays the Access Control authorization mode for the port. The Authorization mode can be one of the following: • force-unauth • auto • force-auth
Auth Status	Displays the current authorization status of the port, either authorized or unauthorized.
Authenticator PAE State	Displays the Authenticator Port Access Entity State. The PAE state can be one of the following: • initialize • disconnected • connecting • authenticating • authenticated • aborting • held • forceAuth
Backend Auth State	Displays the Backend Authorization State. The Backend Authorization state can be one of the following: • request • response • success • fail • timeout • idle

Spanning Tree information

Command: `/info/l2/stp`

```
------------------------------------------------------------------
upfast disabled, update 40
------------------------------------------------------------------


Spanning Tree Group 1: On (STP/PVST+)
VLANs: 1

Current Root:            Path-Cost    Port  Hello MaxAge FwdDel
 8000 00:02:a5:d1:0f:ed        8       20    2     20     15

Parameters:  Priority  Hello  MaxAge  FwdDel  Aging
              32768      2      20      15     300

Port  Priority   Cost   FastFwd    State       Designated Bridge     Des Port
----  --------   ----   --------  ----------   --------------------- -------
  1         0      0       n      FORWARDING *
  2         0      0       n      FORWARDING *
  3         0      0       n      FORWARDING *
```

The switch software uses the IEEE 802.1d Spanning Tree Protocol (STP). If RSTP/MSTP is turned on, see the "Rapid Spanning Tree and Multiple Spanning Tree information" section for Spanning Tree Group information. In addition to seeing if STP is enabled or disabled, you can view the following STP bridge information:

- Status of upfast (Uplink Fast)

- Current root MAC address
- Path-Cost
- Port
- Hello interval
- Maximum age value
- Forwarding delay
- Aging time

You can also refer to the following port-specific STP information:

- Port number and priority
- Cost
- State
- Port Fast Forwarding state
- Designated bridge
- Designated port

The following table describes the STP parameters.

Table 22 STP parameters

Parameter	Description
`Current Root`	Shows information about the root bridge for the Spanning Tree. Information includes the priority (hex) and MAC address of the root.
`Path-Cost`	Path-cost is the total path cost to the root bridge. It is the summation of the path cost between bridges (up to the root bridge).
`Port`	The current root port refers to the port on the switch that receives data from the current root. Zero (0) indicates the root bridge of the STP.
`Priority (bridge)`	The bridge priority parameter controls which bridge on the network will become the STP root bridge.
`Hello`	The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
`MaxAge`	The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network.
`FwdDel`	The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state.
`Aging`	The aging time parameter specifies, in seconds, the amount of time the bridge waits without receiving a packet from a station before removing the station from the Forwarding Database.
`Priority (port)`	The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.
`Cost`	The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost.
`State`	The State field shows the current state of the port. The State field can be one of the following: `BLOCKING`, `LISTENING`, `LEARNING`, `FORWARDING`, or `DISABLED`.
`Designated bridge`	Shows information about the bridge connected to each port, if applicable. Information includes the priority (hex) and MAC address of the Designated Bridge.
`Designated port`	The port ID of the port on the Designated Bridge to which this port is connected.

Rapid Spanning Tree and Multiple Spanning Tree information

Command: `/info/l2/stp`

```
------------------------------------------------------------------
upfast disabled, update 40
------------------------------------------------------------------
Spanning Tree Group 1: On (RSTP)
VLANs: 1-3 4095

Current Root:            Path-Cost  Port Hello MaxAge FwdDel
 8000 00:00:01:00:19:00        0       0    9     20     15

Parameters:  Priority  Hello  MaxAge  FwdDel  Aging
              32768      9      20      15     300

Port  Prio  Cost   State  Role    Designated Bridge   Des Port  Type
----  ----  ----  ------  ----  -------------------- --------  ----
  1     0       0     DSB
  2     0       0     DSB
  3     0       0     DSB
  4     0       0     DSB
  5     0       0     DSB
  6     0       0     DSB
  7     0       0     DSB
  8     0       0     DSB
  9     0       0     DSB
 10     0       0     DISC
 11     0       0     FWD   DESG 8000-00:00:01:00:19:00   8017  P2P2,Edge
 12     0       0     FWD   DESG 8000-00:00:01:00:19:00   8018  P2P
```

The switch software can be set to use the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) or the IEEE 802.1s Multiple Spanning Tree Protocol (MSTP). If RSTP/MSTP is turned on, you can view the following RSTP bridge information for the Spanning Tree Group:

- Status of upfast (Uplink Fast)
- Current root MAC address
- Path-Cost
- Port
- Hello interval
- Maximum age value
- Forwarding delay
- Aging time

You can also refer to the following port-specific RSTP information:

- Port number and priority
- Cost
- State
- Role
- Designated bridge and port
- Link type

The following table describes the STP parameters in RSTP or MSTP mode.

Table 23 Rapid Spanning Tree parameter descriptions

Parameter	Description
`Current Root`	Shows information about the root bridge for the Spanning Tree. Information includes the priority (hex) and MAC address of the root.
`Path-Cost`	Path-cost is the total path cost to the root bridge. It is the summation of the path cost between bridges (up to the root bridge).
`Port`	The current root port refers to the port on the switch that receives data from the current root. Zero (0) indicates the root bridge of the STP.
`Priority (bridge)`	The bridge priority parameter controls which bridge on the network will become the STP root bridge.
`Hello`	The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
`MaxAge`	The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network.
`FwdDel`	The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state.
`Aging`	The aging time parameter specifies, in seconds, the amount of time the bridge waits without receiving a packet from a station before removing the station from the Forwarding Database.
`Priority (port)`	The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.
`Cost`	The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of zero (0) indicates that the cost will be set to the appropriate default after the link speed has been auto-negotiated.
`State`	Shows the current state of the port. The State field in RSTP/MSTP mode can be one of the following: `Discarding (DISC)`, `Learning (LRN)`, `Forwarding (FWD)`, or `Disabled (DSB)`.
`Role`	Shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (DESG), Root (ROOT), Alternate (ALTN), Backup (BKUP), Master (MAST), or Unknown (UNK).
`Designated bridge`	Shows information about the bridge connected to each port, if applicable. Information includes the priority (hex) and MAC address of the Designated Bridge.
`Designated port`	The port ID of the port on the Designated Bridge to which this port is connected.
`Type`	Type of link connected to the port, and whether the port is an edge port. Link type values are AUTO, P2P, or SHARED. MSTP: The Type field appears in /info/cist.

Common Internal Spanning Tree information

Command: `/info/l2/cist`

```
Mstp Digest: 0xac36177f50283cd4b83821d8ab26de62
Common Internal Spanning Tree:
VLANs: 1 3-4094

Current Root:            Path-Cost  Port   MaxAge   FwdDel
 8000 00:03:42:fa:3b:80       11      1       20       15

CIST Regional Root:    Path-Cost
 8000 00:03:42:fa:3b:80       11

Parameters:  Priority  MaxAge  FwdDel  Hops
               32768      20      15    20

Port Prio Cost State  Role Designated Bridge     Des Port Hello Type
---- ---- ---- ------ ---- -------------------- -------- ----- ----
  1  128   2000   FWD DESG 8000-00:03:42:fa:3b:80  8001   4  P2P, Edge
  2  128   2000   FWD DESG 8000-00:03:42:fa:3b:80  8002
  3  128   2000   DSB
  4  128   2000   DSB
  5  128   2000   DSB
  6  128   2000   DSB
  7  128   2000   DSB
  8  128   2000   DSB
  9  128   2000   DSB
 10  128   0      DSB
 11  128   2000   FWD   DESG 8000-00:03:42:fa:3b:80
 12  128   2000   DSB
```

In addition to seeing if Common Internal Spanning Tree (CIST) is enabled or disabled, you can view the following CIST bridge information:

- Status of upfast (Uplink Fast)
- CIST root
- CIST regional root
- Priority
- Maximum age value
- Forwarding delay
- Hops

You can also refer to the following port-specific CIST information:

- Port number and priority
- Cost
- State
- Role
- Designated bridge and port
- Hello interval
- Link type and port type

The following table describes the CIST parameters.

Table 24 Common Internal Spanning Tree parameter descriptions

Parameter	Description
`CIST Root`	Shows information about the root bridge for the Common Internal Spanning Tree (CIST). Values on this row of information refer to the CIST root.
`CIST Regional Root`	Shows information about the root bridge for this MSTP region. Values on this row of information refer to the regional root.
`Priority (bridge)`	The bridge priority parameter controls which bridge on the network will become the STP root bridge.
`MaxAge`	The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network.
`FwdDel`	The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state.
`Hops`	Shows the maximum number of bridge hops allowed before a packet is dropped.
`Priority (port)`	The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.
`Cost`	The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of zero (0) indicates that the cost will be set to the appropriate default after the link speed has been auto-negotiated.
`State`	Shows the current state of the port. The state field can be one of the following: `Discarding (DISC)`, `Learning (LRN)`, `Forwarding` (FWD), or `Disabled (DSB)`.
`Role`	Shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (DESG), Root (ROOT), Alternate (ALTN), Backup (BKUP), Master (MAST), or Unknown (UNK).
`Designated Bridge`	Shows information about the bridge connected to each port, if applicable. Information includes the priority (hex) and MAC address of the Designated Bridge.
`Designated Port`	The port ID of the port on the Designated Bridge to which this port is connected. Information includes the port priority (hex) and the port number (hex).
`Hello`	The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
`Type`	Type of link connected to the port, and whether the port is an edge port. Link type values are AUTO, P2P, or SHARED.

Trunk group information

Command: `/info/l2/trunk`

```
Trunk group 1, Enabled
port state:
  20: STG  1 forwarding
  21: STG  1 forwarding
```

When trunk groups are configured, you can view the state of each port in the various trunk groups.

NOTE: If Spanning Tree Protocol on any port in the trunk group is set to forwarding, the remaining ports in the trunk group will also be set to forwarding.

VLAN information

Command: `/info/l2/vlan`

```
VLAN                Name                Status        Ports
----  --------------------------------- ------  ----------------
1     Default VLAN                        ena   1-16 18 19
10    VLAN 10                             ena   20
20    VLAN 20                             ena   21
4095  Mgmt VLAN                           ena   17
```

This information display includes all configured VLANs and all member ports that have an active link state.

VLAN information includes:

- VLAN Number
- VLAN Name
- Status
- Port membership of the VLAN

Layer 2 general information

Command: `/info/l2/gen`

```
STP uplink fast mode : disabled
```

The following table describes the Layer 2 general information.

Table 25 Layer 2 general information

Field	Description
`STP uplink fast mode`	Displays the status of STP Uplink Fast: enabled or disabled.

Layer 3 information

Command: `/info/l3`

```
[Layer 3 Menu]
     route    - IP Routing Information Menu
     arp      - ARP Information Menu
     ospf     - OSPF Routing Information Menu
     rip      - RIP Routing Information Menu
     ip       - Show IP information
     igmp     - Show IGMP Snooping Multicast Group information
     vrrp     - Show Virtual Router Redundancy Protocol information
     dump     - Dump all layer 3 information
```

The following table describes the **Layer 3 Information Menu** options.

Table 26 Layer 3 information menu options

Command	Usage
`route`	Displays the IP Routing Menu. Using the options of this menu, the system displays the following for each configured or learned route: • Route destination IP address, subnet mask, and gateway address • Type of route • Tag indicating origin of route • Metric for RIP tagged routes, specifying the number of hops to the destination (1-15 hops, or 16 for infinite hops) • The IP interface that the route uses
`arp`	Displays the Address Resolution Protocol (ARP) Information Menu.
`ospf`	Displays OSPF routing Information Menu.
`rip`	Displays Routing Information Protocol Menu.
`ip`	Displays IP Information. IP information, includes: • IP interface information: Interface number, IP address, subnet mask, VLAN number, and operational status. • Default gateway information: Metric for selecting which configured gateway to use, gateway number, IP address, and health status • IP forwarding information: Enable status, Inet and Imask • Port status
`igmp`	Displays IGMP Information Menu.
`vrrp`	Displays the VRRP Information Menu.
`dump`	Dumps all switch information available from the Layer 3 Menu (10K or more, depending on your configuration).

Route information

Command: `/info/l3/route`

```
[IP Routing Menu]
     find     - Show a single route by destination IP address
     gw       - Show routes to a single gateway
     type     - Show routes of a single type
     tag      - Show routes of a single tag
     if       - Show routes on a single interface
     dump     - Show all routes
```

Using the commands listed below, you can display all or a portion of the IP routes currently held in the switch.

Table 27 Route Information menu options

Command	Usage
`find <IP address>`	Displays a single route by IP address. For example: 100.10.1.1
`gw <IP address>`	Displays routes to a single gateway. For example: 100.10.1.2
`type indirect|direct|local|broadcast|martian|multicast`	Displays routes of a single type.
`tag fixed|static|addr|rip|ospf|broadcast|martian|multicast`	Displays routes of a single tag.
`if <1-250>`	Displays routes on a single interface.
`dump`	Displays all routes configured in the switch.

Show all Route information

Command: `/info/l3/route/dump`

```
Status code: * - best
Destination        Mask          Gateway         Type      Tag       Metr If
---------------  --------------- --------------- --------- --------- ---- --
* 11.0.0.0       255.0.0.0       11.0.0.1        direct    fixed          211
* 11.0.0.1       255.255.255.255 11.0.0.1        local     addr           211
* 11.255.255.255 255.255.255.255 11.255.255.255  broadcast broadcast      211
* 12.0.0.0       255.0.0.0       12.0.0.1        direct    fixed          12
* 12.0.0.1       255.255.255.255 12.0.0.1        local     addr           12
* 12.255.255.255 255.255.255.255 12.255.255.255  broadcast broadcast      12
* 13.0.0.0       255.0.0.0       11.0.0.2        indirect  ospf      2    211
* 47.0.0.0       255.0.0.0       47.133.88.1     indirect  static         24
* 47.133.88.0    255.255.255.0   47.133.88.46    direct    fixed          24
* 172.30.52.223  255.255.255.255 172.30.52.223   broadcast broadcast 2
* 224.0.0.0      224.0.0.0       0.0.0.0         martian   martian
* 224.0.0.5      255.255.255.255 0.0.0.0         multicast addr
```

The following table describes the `Type` parameter.

Table 28 IP Routing Type information

Field	Description
`indirect`	The next hop to the host or subnet destination will be forwarded through a router at the `Gateway` address.
`direct`	Packets will be delivered to a destination host or subnet attached to the switch.
`local`	Indicates a route to one of the switch's IP interfaces.
`broadcast`	Indicates a broadcast route.
`martian`	The destination belongs to a host or subnet which is filtered out. Packets to this destination are discarded.
`multicast`	Indicates a multicast route.

The following table describes the `Tag` parameter.

Table 29 IP Routing Tag information

Field	Description
`fixed`	The address belongs to a host or subnet attached to the switch.
`static`	The address is a static route which has been configured on the Switch.
`addr`	The address belongs to one of the switch's IP interfaces.
`rip`	The address was learned by the Routing Information Protocol (RIP).
`ospf`	The address was learned by Open Shortest Path First (OSPF).
`broadcast`	Indicates a broadcast address.
`multicast`	Indicates a multicast address
`martian`	The address belongs to a filtered group.

ARP information

Command: `/info/arp`

```
[Address Resolution Protocol Menu]
      find    - Show a single ARP entry by IP address
      port    - Show ARP entries on a single port
      vlan    - Show ARP entries on a single VLAN
      addr    - Show ARP entries for switch's interface
      dump    - Show all ARP entries
```

The Address Resolution Protocol (ARP) information includes IP address and MAC address of each entry, address status flags, VLAN, and port for the address, and port referencing information.

The following table describes the **Address Resolution Protocol Menu** options.

Table 30 ARP information

Command	Usage
`find <IP address>`	Displays a single ARP entry by IP address. For example: 192.4.17.101
`port <port number>`	Displays the ARP entries on a single port.
`vlan <1-4095>`	Displays the ARP entries on a single VLAN.
`dump`	Displays all ARP entries, including: • IP address and MAC address of each entry • Address status flag • The VLAN and port to which the address belongs The ports which have referenced the address (empty if no port has routed traffic to the IP address shown)
`addr`	Displays the ARP address list: IP address, IP mask, MAC address, and VLAN flags.

Show all ARP entry information

Command: `/info/arp/dump`

```
IP address      Flags     MAC address               VLAN      Port
--------------- -----    -----------------          ----      ----
192.168.2.4             00:50:8b:b2:32:cb          1         18
192.168.2.19            00:0e:7f:25:89:b5          1         17
192.168.2.61    P       00:0f:6a:ed:46:00          1
```

The Flag field provides additional information about an entry. If no flag displays, the entry is normal.

Table 31 ARP dump flag parameters

Flag	Description
`P`	Permanent entry created for switch IP interface.
`R`	Indirect route entry.
`U`	Unresolved ARP entry. The MAC address has not been learned.

ARP address list information

Command: `/info/arp/addr`

```
  IP address        IP mask        MAC address     VLAN Flags
--------------- --------------  ----------------- ---- -----
205.178.18.66   255.255.255.255  00:70:cf:03:20:04        P
205.178.50.1    255.255.255.255  00:00:cf:03:20:06   1
205.178.50.1    255.255.255.255  00:70:cf:03:20:04   1
```

This screen displays all entries in the ARP cache.

OSPF information

Command: `/info/l3/ospf`

```
[OSPF Information Menu]
     general  - Show general information
     aindex   - Show area(s) information
     if       - Show interface(s) information
     virtual  - Show details of virtual links
     nbr      - Show neighbor(s) information
     dbase    - Database Menu
     sumaddr  - Show summary address list
     nsumadd  - Show NSSA summary address list
     routes   - Show OSPF routes
     dump     - Show OSPF information
```

The following table describes the OSPF Menu options.

Table 32 OSPF information

Command	Usage
`general`	Displays general OSPF information.
`aindex <0-2>`	Displays area information for a particular area index. If no parameter is supplied, it displays area information for all the areas.
`if <1-249>`	Displays interface information for a particular interface. If no parameter is supplied, it displays information for all the interfaces.
`virtual`	Displays information about all the configured virtual links.
`nbr <nbr router-id (A.B.C.D)>`	Displays the status of a neighbor with a particular router ID. If no router ID is supplied, it displays the information about all the current neighbors.
`dbase`	Displays OSPF database menu.
`sumaddr <0-2>`	Displays the list of summary ranges belonging to non-NSSA areas.
`nsumadd <0-2>`	Displays the list of summary ranges belonging to NSSA areas.
`routes`	Displays OSPF routing table.
`dump`	Displays all OSPF information.

OSPF general information

Command: `/info/l3/ospf/general`

```
OSPF Version 2
Router ID: 10.10.10.1
Started at 1663 and the process uptime is 4626
Area Border Router: yes, AS Boundary Router: no
LS types supported are 6
External LSA count 0
External LSA checksum sum 0x0
Number of interfaces in this router is 2
Number of virtual links in this router is 1
16 new lsa received and 34 lsa originated from this router
Total number of entries in the LSDB 10
Database checksum sum 0x0
Total neighbors are 1, of which
                                2 are >=INIT state,
                                2 are >=EXCH state,
                                2 are =FULL state
Number of areas is 2, of which 3-transit 0-nssa
        Area Id : 0.0.0.0
        Authentication : none
        Import ASExtern : yes
        Number of times SPF ran : 8
        Area Border Router count : 2
        AS Boundary Router count : 0
        LSA count : 5
        LSA Checksum sum : 0x2237B
        Summary : no Summary
```

OSPF interface information

Command: `/info/l3/ospf/if <1-249>`

```
Ip Address 10.10.12.1, Area 0.0.0.1, Admin Status UP
   Router ID 10.10.10.1, State DR, Priority 1
   Designated Router (ID) 10.10.10.1, Ip Address 10.10.12.1
   Backup Designated Router (ID) 10.10.14.1, Ip Address 10.10.12.2
   Timer intervals, Hello 10, Dead 40, Wait 1663, Retransmit 5,
   Transit delay 1
   Neighbor count is 1 If Events 4, Authentication type none
```

OSPF Database information

Command: `/info/l3/ospf/dbase`

```
[OSPF Database Menu]
     advrtr   - LS Database info for an Advertising Router
     asbrsum  - ASBR Summary LS Database info
     dbsumm   - LS Database summary
     ext      - External LS Database info
     nw       - Network LS Database info
     nssa     - NSSA External LS Database info
     rtr      - Router LS Database info
     self     - Self Originated LS Database info
     summ     - Network-Summary LS Database info
     all      - All
```

The following table describes the OSPF Database information menu options.

Table 33 OSPF Database information

Command	Usage
advrtr <*router-id (A.B.C.D)*>	Takes advertising router as a parameter. Displays all the Link State Advertisements (LSAs) in the LS database that have the advertising router with the specified router ID, for example: 20.1.1.1.
asbrsum <*adv-rtr (A.B.C.D)*>| <*link_state_id (A.B.C.D*>|<self>	Displays ASBR summary LSAs. The usage of this command is as follows: a. asbrsum adv-rtr 20.1.1.1 displays ASBR summary LSAs having the advertising router 20.1.1.1. b. asbrsum link_state_id 10.1.1.1 displays ASBR summary LSAs having the link state ID 10.1.1.1. c. asbrsum self displays the self advertised ASBR summary LSAs. d. asbrsum with no parameters displays all the ASBR summary LSAs.
dbsumm	Displays the following information about the LS database in a table format: a. The number of LSAs of each type in each area. b. The total number of LSAs for each area. c. The total number of LSAs for each LSA type for all areas combined. d. The total number of LSAs for all LSA types for all areas combined. No parameters are required.
ext <*adv-rtr (A.B.C.D)*>| <*link_state_id (A.B.C.D)*>|<*self*>	Displays the AS-external (type 5) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command asbrsum.
nw <*adv-rtr (A.B.C.D)*>| <*link_state_id (A.B.C.D)*>|<*self*>	Displays the network (type 2) LSAs with detailed information of each field of the LSA.network LS database. The usage of this command is the same as the usage of the command asbrsum.
nssa <*adv-rtr (A.B.C.D)*>| <*link_state_id* (A.B.C.D)>|<self>	Displays the NSSA (type 7) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command asbrsum.
rtr <*adv-rtr (A.B.C.D)*>| <*link_state_id (A.B.C.D)*>|<*self*>	Displays the router (type 1) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command asbrsum.
self	Displays all the self-advertised LSAs. No parameters are required.
summ <*adv-rtr (A.B.C.D)*>| <*link_state_id (A.B.C.D)*>|<*self*>	Displays the network summary (type 3) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command asbrsum.
all	Displays all the LSAs.

OSPF route codes information

Command: `/info/l3/ospf/routes`

```
Codes: IA - OSPF inter area,
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
IA 10.10.0.0/16 via 200.1.1.2
IA 40.1.1.0/28 via 20.1.1.2
IA 80.1.1.0/24 via 200.1.1.2
IA 100.1.1.0/24 via 20.1.1.2
IA 140.1.1.0/27 via 20.1.1.2
IA 150.1.1.0/28 via 200.1.1.2
E2 172.18.1.1/32 via 30.1.1.2
E2 172.18.1.2/32 via 30.1.1.2
E2 172.18.1.3/32 via 30.1.1.2
E2 172.18.1.4/32 via 30.1.1.2
E2 172.18.1.5/32 via 30.1.1.2
E2 172.18.1.6/32 via 30.1.1.2
E2 172.18.1.7/32 via 30.1.1.2
E2 172.18.1.8/32 via 30.1.1.2
```

Routing Information Protocol information

Command: `/info/l3/rip`

```
[RIP Information Menu]
     routes   - Show RIP routes
     dump     - Show RIP user's configuration
```

The following table describes the Routing Information Protocol information menu options.

Table 34 RIP information

Command	Usage
`routes`	Displays information about RIP routes.
`dump <0-249>`	Displays RIP user's configuration. Enter 0 (zero) for all interfaces.

RIP Routes information

Command: `/info/l3/rip/routes`

```
>> IP Routing# /info/l3/rip/routes

3.0.0.0/8 via 30.1.1.11 metric 4
4.0.0.0/16 via 30.1.1.11 metric 16
10.0.0.0/8 via 30.1.1.2 metric 3
20.0.0.0/8 via 30.1.1.2 metric 2
```

This table contains all dynamic routes learned through RIP, including the routes that are undergoing garbage collection with metric = 16. This table does not contain directly connected routes and locally configured static routes.

RIP user configuration

Command: `/info/l3/rip/dump <0-249>`

```
RIP USER CONFIGURATION :
RIP on updat 30
RIP Interface 2 : 102.1.1.1, enabled
version 2, listen enabled, supply enabled, default none
poison disabled, trigg enabled, mcast enabled, metric 1
auth none,key none
RIP Interface 3 : 103.1.1.1, enabled
version 2, listen enabled, supply enabled, default none
poison disabled, trigg enabled, mcast enabled, metric 1
```

IP information

Command: `/info/l3/ip`

```
Interface information:
  1: 47.80.23.243    255.255.254.0   47.80.23.255,    vlan 1, up

Default gateway information: metric strict
  1: 198.168.9.1,     vian any,  active
  2: 192.168.12.235,  vian any,  active


Current BOOTP relay settings: OFF
  0.0.0.0, 0.0.0.0

Current IP forwarding settings: OFF, dirbr disabled

Current network filter settings:
  none

Current route map settings:
```

The following interface and default gateway information is displayed:

- Interface number
- IP address
- IP mask
- IP broadcast address
- Operational status
- Bootp relay settings
- Network filter settings
- Route map settings

IGMP multicast group information

Command: `/info/l3/igmp`

```
[IGMP Multicast Menu]
      mrouter - Show IGMP Snooping Multicast Router Port information
      find    - Show a single group by IP group address
      vlan    - Show groups on a single vlan
      port    - Show groups on a single port
      trunk   - Show groups on a single trunk
      detail  - Show detail of a single group by IP group address
      dump    - Show all groups
```

The following table describes the commands used to display information about IGMP groups learned by the switch.

Table 35 IGMP Multicast Group menu options

Command	Usage
`mrouter`	Displays the Multicast Router Menu.
`find <IP address>`	Displays a single IGMP multicast group by its IP address.
`vlan <1-4094>`	Displays all IGMP multicast groups on a single VLAN.
`port <port number>`	Displays all IGMP multicast groups on a single port.
`trunk <1-40>`	Displays all IGMP multicast groups on a single trunk group.
`Detail <IP adress>`	Displays details about IGMP multicast groups, including source and timer information.
`dump`	Displays information for all multicast groups.

IGMP multicast router port information

Command: `/info/l3/igmp/mrouter`

```
[IGMP Multicast Router Menu]
      vlan - Show all multicast router ports on a single vlan
      dump - Show all multicast router ports
```

The following table describes the commands used to display information about multicast routers learned through IGMP Snooping.

Table 36 IGMP Multicast Router menu options

Command	Usage
`vlan <1-4094>`	Displays information for all multicast groups on a single VLAN.
`dump`	Displays information for all multicast groups learned by the switch.

VRRP information

Virtual Router Redundancy Protocol (VRRP) support on the switch provides redundancy between routers in a LAN. This is accomplished by configuring the same virtual router IP address and ID number on each participating VRRP-capable routing device. One of the virtual routers is then elected as the master, based on a number of priority criteria, and assumes control of the shared virtual router IP address. If the master fails, one of the backup virtual routers will assume routing authority and take control of the virtual router IP address.

Command: `/info/vrrp`

```
VRRP information:
1: vrid 2, 205.178.18.210, if 1, renter, prio 100, master, server
2: vrid 1, 205.178.18.202, if 1, renter, prio 100, backup
3: vrid 3, 205.178.18.204, if 1, renter, prio 100, master, proxy
```

When virtual routers are configured, you can view the status of each virtual router using this command. VRRP information includes:

- Virtual router number
- Virtual router ID and IP address
- Interface number
- Ownership status
  - `owner` identifies the preferred master virtual router. A virtual router is the owner when the IP address of the virtual router and its IP interface are the same.
  - `renter` identifies virtual routers which are not owned by this device
- Priority value. During the election process, the virtual router with the highest priority becomes master.
- Activity status
  - `master` identifies the elected master virtual router.
  - `backup` identifies that the virtual router is in backup mode.
  - `init` identifies that the virtual router is waiting for a startup event. Once it receives a startup event, it transitions to master if its priority is 255, (the IP address owner), or transitions to backup if it is not the IP address owner.
- Server status. The `server` state identifies virtual routers.
- Proxy status. The proxy state identifies virtual proxy routers, where the virtual router shares the same IP address as a proxy IP address. The use of virtual proxy routers enables redundant switches to share the same IP address, minimizing the number of unique IP addresses that must be configured.

QoS information

Command: `/info/qos`

```
[QoS Menu]
     8021p    - Show QOS 802.1p information
```

The following table describes the commands used to display Quality of Service (QoS) information.

Table 37 QoS menu options

Command	Usage
8021p	Displays the QoS 802.1p Information Menu.

802.1p information

Command: `/info/qos/8021p`

```
Current priority to COS queue information:
Priority  COSq  Weight
--------  ----  ------
    0       0      1
    1       0      1
    2       0      1
    3       0      1
    4       1      2
    5       1      2
    6       1      2
    7       1      2

Current port priority information:
Port   Priority  COSq  Weight
-----  --------  ----  ------
   1       0       0      1
   2       0       0      1
   3       0       0      1
   4       0       0      1
…
  20       0       0      1
  21       0       0      1
```

The following table describes the IEEE 802.1p priority to COS queue information.

Table 38 802.1p Priority to COS Queue information

Field	Description
Priority	Displays the 802.1p Priority level.
Cosq	Displays the Class of Service queue.
Weight	Displays the scheduling weight of the COS queue.

The following table describes the IEEE 802.1p port priority information.

Table 39 802.1p Port Priority information

Field	Description
Port	Displays the port number.
Priority	Displays the 802.1p Priority level.
Cosq	Displays the Class of Service (COS) queue.
Weight	Displays the scheduling weight.

ACL information

Command: `/info/acl`

```
Current ACL information:
------------------------
  Filter 1 profile:
   Ethernet
     - VID        : 1/0xfff
   Actions        : Set COS to 0
  Filter 2 profile:
   Ethernet
     - VID        : 1/0xfff
   Actions        : Permit
  No ACL groups configured.
```

Access Control List (ACL) information provides configuration parameters for each Access Control List. It also shows which ACLs are included in each ACL Group.

RMON Information Menu

Command: `/info/rmon`

```
[RMON Information Menu]
      hist    - Show RMON History group information
      alarm   - Show RMON Alarm group information
      event   - Show RMON Event group information
      dump    - Show all RMON information
```

The following table describes the RMON Information parameters.

Table 40 RMON History Information Menu `/info/rmon/hist`

Command	Usage
`hist`	Displays the RMON History Information menu.
`alarm`	Displays the RMON Alarm Information menu.
`event`	Displays the RMON Event Information menu.
`dump`	Displays all RMON Information parameters.

RMON history information

Command: `/info/rmon/hist`

```
RMON History group configuration:

Index               IFOID               Interval  Rbnum  Gbnum
-----  -------------------------------  --------  -----  -----
    1          1.3.6.1.2.1.2.2.1.1.24        30      5      5
    2          1.3.6.1.2.1.2.2.1.1.24        30      5      5
    3          1.3.6.1.2.1.2.2.1.1.18        30      5      5
    4          1.3.6.1.2.1.2.2.1.1.19        30      5      5
    5          1.3.6.1.2.1.2.2.1.1.24      1800      5      5
```

The following table describes the RMON History Information parameters.

Table 41 RMON History Information Menu `/info/rmon/hist`

Command	Usage
`Index`	Displays the index number that identifies each history instance.
`IFOID`	Displays the MIB Object Identifier.
`Interval`	Displays the time interval for each for each sampling bucket.
`Rbnum`	Displays the number of requested buckets, which is the number of data slots into which data is to be saved.

Table 41 RMON History Information Menu `/info/rmon/hist`

Command	Usage
`Gbnum`	Displays the number of granted buckets that may hold sampled data.

RMON alarm information

Command: `/info/rmon/alarm`

```
RMON Alarm group configuration:

Index  Interval  Type   rLimit    fLimit   rEvtIdx  fEvtIdx  last value
-----  --------  ----  --------  --------  -------  -------  ----------
    1        30   abs        10         0        1        0           0
    2       900   abs         0        10        0        2           0
    3       300   abs        10        20        0        0           0
    4      1800   abs        10         0        1        0           0
    5      1800   abs        10         0        1        0           0
    8      1800   abs        10         0        1        0    56344540
   10      1800   abs        10         0        1        0           0
   11      1800   abs        10         0        1        0           0
   15      1800   abs        10         0        1        0           0
   18      1800   abs        10         0        1        0           0
  100      1800   abs        10         0        1        0           0

Index               OID
-----  ------------------------------
    1        1.3.6.1.2.1.2.2.1.10.257
    2        1.3.6.1.2.1.2.2.1.11.258
    3        1.3.6.1.2.1.2.2.1.12.259
    4        1.3.6.1.2.1.2.2.1.13.260
    5        1.3.6.1.2.1.2.2.1.14.261
    8        1.3.6.1.2.1.2.2.1.10.280
   10        1.3.6.1.2.1.2.2.1.15.262
   11        1.3.6.1.2.1.2.2.1.16.263
   15        1.3.6.1.2.1.2.2.1.19.266
   18        1.3.6.1.2.1.2.2.1.10.279
  100        1.3.6.1.2.1.2.2.1.17.264
```

The following table describes the RMON Alarm Information parameters.

Table 42 RMON Alarm Information Menu `/info/rmon/alarm`

Command	
`Index`	Displays the index number that identifies each alarm instance.
`Interval`	Displays the time interval over which data is sampled and compared with the rising and falling thresholds.
`Type`	Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds, as follows: **abs**: absolute value, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. **delta**: delta value, the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds.
`rLimit`	Displays the rising threshold for the sampled statistic.
`fLimit`	Displays the falling threshold for the sampled statistic.
`rEvtIdx`	Displays the rising alarm event index that is triggered when a rising threshold is crossed.
`fEvtIdx`	Displays the falling alarm event index that is triggered when a falling threshold is crossed.
`Last value`	Displays the last sampled value.
`OID`	Displays the MIB Object Identifier for each alarm index.

RMON event information

Command: `/info/rmon/event`

```
RMON Event group configuration:

Index  Type     Last Sent                 Description
-----  ----  ----------------  ---------------------------------
    1  both    0D: 0H: 1M:20S   Event_1
    2  none    0D: 0H: 0M: 0S   Event_2
    3   log    0D: 0H: 0M: 0S   Event_3
    4  trap    0D: 0H: 0M: 0S   Event_4
    5  both    0D: 0H: 0M: 0S   Log and trap event for Link Down
   10  both    0D: 0H: 0M: 0S   Log and trap event for Link Up
   11  both    0D: 0H: 0M: 0S   Send log and trap for icmpInMsg
   15  both    0D: 0H: 0M: 0S   Send log and trap for icmpInEchos
  100  both    0D: 0H: 0M: 0S   Event_100
```

The following table describes the RMON Event Information parameters.

Table 43 RMON Event Information Menu `/info/rmon/event`

Command	Usage
`Index`	Displays the index number that identifies each event instance.
`Type`	Displays the type of notification provided for this event, as follows: `none`, `log`, `trap`, `both`.
`Last Sent`	Displays the time that passed since the last switch reboot, when the most recent event was triggered. This value is cleared when the switch reboots.
`Description`	Displays a text description of the event.

Link status information

Command: `/info/link`

```
-------------------------------------------------------------------
Port    Speed    Duplex     Flow Ctrl      Link
-----   -----   --------  --TX-----RX--   ------
  1    10000     full      yes    yes    disabled
  2    10000     full      yes    yes    disabled
  3    10000     full      yes    yes    disabled
  4    10000     full      yes    yes    disabled
  5    10000     full      yes    yes    disabled
  6    10000     full      yes    yes    disabled
  7    10000     full      yes    yes    disabled
  8    10000     full      yes    yes    disabled
  9    10000     full      yes    yes    disabled
 10    10000     full      yes    yes    disabled
 11    10000     full      yes    yes    disabled
 12    10000     full      yes    yes    disabled
 13    10000     full      yes    yes    disabled
 14    10000     full      yes    yes    disabled
 15    10000     full      yes    yes    disabled
 16    10000     full      yes    yes    disabled
 17      any      any      yes    yes       up
 18    10000     full      yes    yes      down
 19    10000     full      yes    yes      down
 20    10000     full      yes    yes      down
 21    10000     full      yes    yes      down
```

Use this command to display link status information about each port on a switch, including:

- Port number
- Port speed (10 Mb/s, 100 Mb/s, 10000 Mb/s, or any)
- Duplex mode (half, full, or any)
- Flow control for transmit and receive (no, yes, or any)
- Link status (up or down)

Port information

Command: `/info/port`

```
Port Tag RMON PVID      NAME                 VLAN(s)
---- --- ---- ---- -------------- --------------------------------
  1   n   d      1 Downlink1      1
  2   n   d      1 Downlink2      1
  3   n   d      1 Downlink3      1
  4   n   d      1 Downlink4      1
  5   n   d      1 Downlink5      1
  6   n   d      1 Downlink6      1
  7   n   d      1 Downlink7      1
  8   n   d      1 Downlink8      1
  9   n   d      1 Downlink9      1
 10   n   d      1 Downlink10     1
 11   n   d      1 Downlink11     1
 12   n   d      1 Downlink12     1
 13   n   d      1 Downlink13     1
 14   n   d      1*Downlink14     1
 15   n   d      1*Downlink15     1
 16   n   d      1*Downlink16     1
 17   n   d   4095 Mgmt           4095
 18   n   d      1*Uplink1        1
 19   n   d      1*Uplink2        1
 20   n   d      1*Uplink3        1
 21   n   d      1*Uplink4        1
* = PVID is tagged.
```

Port information includes:

- Port number
- Whether the port uses VLAN tagging or not (y or n)
- Whether Remote Monitoring (RMON) is enabled or disabled (e or d)
- Port VLAN ID (PVID)
- Port name
- VLAN membership

SFP information

Command: /info/sfp

```
 Port  Device TX-Enable RX-Signal TX-Fault
------ ------ --------- --------- --------
 SFP21 FI-SFP   **** NOT Installed ****
 SFP22 FI-SFP   **** NOT Installed ****
 SFP23 FI-SFP  enabled      ok      none
 SFP24 FI-SFP  enabled      ok      none
```

This command displays the status of the Small Form Pluggable (SFP) module on each Fiber External Port.

Uplink Failure Detection information

Command: `/info/ufd`

```
Uplink Failure Detection 1: Enabled
LtM status: Down
Member      STG    STG State       Link Status
---------   ---    ------------    -----------
  port 20                          down
             1       DISABLED
            10       DISABLED *
            15       DISABLED *
* = STP turned off for this port.

LtD status: Auto Disabled
Member       Link Status
---------    -----------
  port  1      disabled
  port  2      disabled
  port  3      disabled
  port  4      disabled

Uplink Failure Detection 2: Disabled

Uplink Failure Detection 3: Disabled

Uplink Failure Detection 4: Disabled
```

UFD (Uplink Failure Detection) information includes:

- UFD status, either enabled or disabled
- LtM status and member ports
- Spanning Tree status for LtM ports
- LtD status and member ports

Information dump

Command: `/info/dump`

Use the **dump** command to dump all switch information available from the Information Menu (10K or more, depending on your configuration). This data is useful for tuning and debugging switch performance.

Statistics Menu

Introduction

You can view switch performance statistics in the user, operator, and administrator command modes. This chapter discusses how to use the CLI to display switch statistics.

Menu information

Command: `/stats`

```
[Statistics Menu]
     port     - Port Stats Menu
     clrports - Clear stats for all ports
     l2       - Layer 2 Stats Menu
     l3       - Layer 3 Stats Menu
     mp       - MP-specific Stats Menu
     acl      - ACL Stats Menu
     snmp     - Show SNMP stats
     ntp      - Show NTP stats
     ufd      - Show Uplink Failure Detection stats
     clrmp    - Clear all MP related stats
     dump     - Dump all stats
```

The following table describes the Statistics Menu options.

Table 44 Statistics Menu options

Command	Usage
`port <port number>`	Displays the Port Statistics Menu for the specified port. Use this command to display traffic statistics on a port-by-port basis. Traffic statistics are included in SNMP Management Information Base (MIB) objects.
`clrports`	Clear statistics counters for all ports.
`l2`	Displays the Layer 2 Statistics Menu.
`l3`	Displays the Layer 3 Statistics Menu.
`mp`	Displays the Management Processor Statistics Menu.
`acl`	Displays the Access Control List Statistics Menu.
`snmp`	Displays SNMP statistics.
`ntp <clear>`	Displays Network Time Protocol (NTP) Statistics. Add the argument, `clear`, to clear NTP statistics.
`ufd <clear>`	Displays Uplink Failure Detection statistics. Add the argument, `clear`, to clear UFD statistics.
`clrmp`	Clears all Management Processor Statistics.
`dump`	Dumps all switch statistics. Use this command to gather data for tuning and debugging switch performance. If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump command.

Port Statistics Menu

Command: `/stats/port <port number>`

```
[Port Statistics Menu]
      8021x   - Show 802.1x stats
      brg     - Show bridging ("dot1") stats
      ether   - Show Ethernet ("dot3") stats
      if      - Show interface ("if") stats
      ip      - Show Internet Protocol ("IP") stats
      link    - Show link stats
      rmon    - Show RMON stats
      clear   - Clear all port stats
```

This menu displays traffic statistics on a port-by-port basis.

The following table describes the Port Statistics Menu options:

Table 45 Port Statistics Menu options

Command	Usage
8021x	Displays IEEE 802.1x statistics
brg	Displays bridging (“dot1”) statistics for the port.
ether	Displays Ethernet (“dot3”) statistics for the port.
if	Displays interface statistics for the port.
ip	Displays Internet Protocol statistics for the port.
link	Displays link statistics for the port.
rmon	Displays Remote Monitoring (RMON) statistics for the port.
clear	Clears all the statistics on the port.

802.1x statistics

Command: /stats/port <*port number*>/8021x

```
Authenticator Statistics:
  eapolFramesRx          = 0
  eapolFramesTx          = 0
  eapolStartFramesRx     = 0
  eapolLogoffFramesRx    = 0
  eapolRespIdFramesRx    = 0
  eapolRespFramesRx      = 0
  eapolReqIdFramesTx     = 0
  eapolReqFramesTx       = 0
  invalidEapolFramesRx   = 0
  eapLengthErrorFramesRx = 0
  lastEapolFrameVersion  = 0
  lastEapolFrameSource   = 00:00:00:00:00:00

Authenticator Diagnostics:
  authEntersConnecting                 = 0
  authEapLogoffsWhileConnecting        = 0
  authEntersAuthenticating             = 0
  authSuccessesWhileAuthenticating     = 0
  authTimeoutsWhileAuthenticating      = 0
  authFailWhileAuthenticating          = 0
  authReauthsWhileAuthenticating       = 0
  authEapStartsWhileAuthenticating     = 0
  authEapLogoffWhileAuthenticating     = 0
  authReauthsWhileAuthenticated        = 0
  authEapStartsWhileAuthenticated      = 0
  authEapLogoffWhileAuthenticated      = 0
  backendResponses                     = 0
  backendAccessChallenges              = 0
  backendOtherRequestsToSupplicant     = 0
  backendNonNakResponsesFromSupplicant = 0
  backendAuthSuccesses                 = 0
  backendAuthFails                     = 0
```

The following table describes the 802.1x authenticator diagnostics for a selected port:

Table 46 802.1x statistics for port

Statistics	Description
Authenticator Diagnostics	
authEntersConnecting	Total number of times that the state machine transitions to the CONNECTING state from any other state.
authEapLogoffsWhileConnecting	Total number of times that the state machine transitions from CONNECTING to DISCONNECTED as a result of receiving an EAPOL-Logoff message.
authEntersAuthenticating	Total number of times that the state machine transitions from CONNECTING to AUTHENTICATING, as a result of an EAPResponse/ Identity message being received from the Supplicant.

Table 46 802.1x statistics for port

Statistics	Description
authSuccessesWhile Authenticating	Total number of times that the state machine transitions from AUTHENTICATING to AUTHENTICATED, as a result of the Backend Authentication state machine indicating successful authentication of the Supplicant.
authTimeoutsWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of the Backend Authentication state machine indicating authentication timeout.
authFailWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to HELD, as a result of the Backend Authentication state machine indicating authentication failure.
authReauthsWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of a re-authentication request
authEapStartsWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of an EAPOL-Start message being received from the Supplicant.
authEapLogoffWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of an EAPOL-Logoff message being received from the Supplicant.
authReauthsWhileAuthenticated	Total number of times that the state machine transitions from AUTHENTICATED to CONNECTING, as a result of a re-authentication request.
authEapStartsWhileAuthenticated	Total number of times that the state machine transitions from AUTHENTICATED to CONNECTING, as a result of an EAPOL-Start message being received from the Supplicant.
authEapLogoffWhileAuthenticated	Total number of times that the state machine transitions from AUTHENTICATED to DISCONNECTED, as a result of an EAPOLLogoff message being received from the Supplicant.
backendResponses	Total number of times that the state machine sends an initial Access-Request packet to the Authentication server. Indicates that the Authenticator attempted communication with the Authentication Server.
backendAccessChallenges	Total number of times that the state machine receives an initial Access-Challenge packet from the Authentication server. Indicates that the Authentication Server has communication with the Authenticator.
backendOtherRequestsToSupplicant	Total number of times that the state machine sends an EAP-Request packet (other than an Identity, Notification, Failure, or Success message) to the Supplicant. Indicates that the Authenticator chose an EAP-method.
backendNonNakResponsesFrom Supplicant	Total number of times that the state machine receives a response from the Supplicant to an initial EAP-Request, and the response is something other than EAP-NAK. Indicates that the Supplicant can respond to the Authenticators chosen EAP-method.
backendAuthSuccesses	Total number of times that the state machine receives an Accept message from the Authentication Server. Indicates that the Supplicant has successfully authenticated to the Authentication Server.
backendAuthFails	Total number of times that the state machine receives a Reject message from the Authentication Server. Indicates that the Supplicant has not authenticated to the Authentication Server.

Bridging statistics

Command: `/stats/port <port number>/brg`

```
Bridging statistics for port 1:
dot1PortInFrames:                    63242584
dot1PortOutFrames:                   63277826
dot1PortInDiscards:                         0
dot1TpLearnedEntryDiscards:                 0
dot1StpPortForwardTransitions:              0
```

The following table describes the bridging statistics for a selected port:

Table 47 Bridging statistics for port

Statistics	Description
dot1PortInFrames	The number of frames that have been received by this port from its segment. A frame received on the interface corresponding to this port is counted by this object, if and only if, it is for a protocol being processed by the local bridging function, including bridge management frames.
dot1PortOutFrames	The number of frames that have been transmitted by this port to its segment. A frame transmitted on the interface corresponding to this port is counted by this object, if and only if, it is for a protocol being processed by the local bridging function, including bridge management frames.
dot1PortInDiscards	Count of valid frames received which were discarded (that is, filtered) by the forwarding process.
dot1TpLearnedEntryDiscards	The total number of Forwarding Database entries, which have been or would have been learned, but have been discarded due to a lack of space to store them in the Forwarding Database. If this counter is increasing, it indicates that the Forwarding Database is regularly becoming full (a condition which has adverse performance effects on the sub network). If this counter has a significant value but is not presently increasing, it indicates that the problem has been occurring but is not persistent.
dot1StpPortForwardTransitions	The number of times this port has transitioned from the Learning state to the Forwarding state.

Ethernet statistics

Command: `/stats/port <port number>/ether`

```
Ethernet statistics for port 1:
dot3StatsAlignmentErrors:                0
dot3StatsFCSErrors:                      0
dot3StatsSingleCollisionFrames:          0
dot3StatsMultipleCollisionFrames:        0
dot3StatsLateCollisions:                 0
dot3StatsExcessiveCollisions:            0
dot3StatsInternalMacTransmitErrors:     NA
dot3StatsFrameTooLongs:                  0
dot3StatsInternalMacReceiveErrors:       0
```

The following table describes the Ethernet statistics for a selected port:

Table 48 Ethernet statistics for port

Statistics	Description
dot3StatsAlignmentErrors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the Frame Check Sequence (FCS) check. The count represented by an instance of this object is incremented when the alignmentError status is returned by the MAC service to the Logical Link Control (LLC) (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
dot3StatsFCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the Frame Check Sequence (FCS) check. The count represented by an instance of this object is incremented when the frameCheckError status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
dot3StatsSingleCollisionFrames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts, and is not counted by the corresponding instance of the dot3StatsMultipleCollisionFrame object.
dot3StatsMultipleCollisionFrames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts, and is not counted by the corresponding instance of the dot3StatsSingleCollisionFrames object.
dot3StatsLateCollisions	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet. Five hundred and twelve bit-times corresponds to 51.2 microseconds on a 10 Mbit/s system. A (late) collision included in a count represented by an instance of this object is also considered as a (generic) collision for purposes of other collision-related statistics.
dot3StatsExcessiveCollisions	A count of frames for which transmission on a particular interface fails due to excessive collisions.

Table 48 Ethernet statistics for port

Statistics	Description
dot3StatsInternalMacTransmitErrors	A count of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the dot3StatsLateCollisions object, the dot3StatsExcessiveCollisions object, or the dot3StatsCarrierSenseErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object may represent a count of transmission errors on a particular interface that are not otherwise counted.
dot3StatsFrameTooLongs	A count of frames received on a particular interface that exceeds the maximum permitted frame size. The count represented by an instance of this object is incremented when the frameTooLong status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
dot3StatsInternalMacReceiveErrors	A count of frames for which reception on a particular interface fails due to an internal MAC sublayer receive error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of the dot3StatsFrameTooLongs object, the dot3StatsAlignmentErrors object, or the dot3StatsFCSErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object may represent a count of received errors on a particular interface that are not otherwise counted.

Interface statistics

Command: `/stats/port <port number>/if`

```
Interface statistics for port 1:
                    ifHCIn Counters       ifHCOut Counters
Octets:                 51697080313            51721056808
UcastPkts:                 65356399               65385714
BroadcastPkts:                    0                   6516
MulticastPkts:                    0                      0
Discards:                         0                      0
Errors:                           0                  21187
```

The following table describes the interface (IF) statistics for a selected port:

Table 49 Interface statistics for port

Statistics	Description
Octets—IfHCIn	The total number of octets received on the interface, including framing characters.
UcastPkts—IfHCIn	The number of packets, delivered by this sublayer to a higher sublayer, which were not addressed to a multicast or broadcast address at this sublayer.
BroadcastPkts—IfHCIn	The number of packets, delivered by this sublayer to a higher sublayer, which were addressed to a broadcast address at this sublayer.
MulticastPkts—IfHCIn	The total number of packets, delivered by this sublayer. These are the packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast address at this sublayer, including those that were discarded or not sent. For a MAC layer protocol, this includes both group and functional addresses.
Discards—IfHCIn	The number of inbound packets which were chosen to be discarded even though no errors were detected to prevent their being delivered to a higher-layer protocol.
Errors—IfHCIn	For packet-oriented interfaces, the number of inbound packets that contained errors preventing them from being delivered to a higher-layer protocol.
Octets—IfHCOut	The total number of octets transmitted out of the interface, including framing characters.
UcastPkts—IfHCOut	The total number of packets that higher-level protocols requested to be transmitted, and which were not addressed to a multicast or broadcast address at this sublayer, including those that were discarded or not sent.
BroadcastPkts—IfHCOut	The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a broadcast address at this sublayer, including those that were discarded or not sent.
MulticastPkts—IfHCOut	The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast address at this sublayer, including those that were discarded or not sent.
Discards—IfHCOut	The number of outbound packets that were chosen to be discarded even though no errors had been detected to prevent their being transmitted.
Errors—IfHCOut	For packet-oriented interfaces, the number of outbound packets that could not be transmitted because of errors. .

Internet Protocol (IP) statistics

Command: `/stats/port <port number>/ip`

```
GEA IP statistics for port 1:
ipInReceives   :         0
ipInHeaderError:         0
ipInDiscards   :         0
```

The following table describes the Internet Protocol (IP) statistics for a selected port:

Table 50 IP statistics for port

Statistics	Description
ipInReceives	The total number of input datagrams received from interfaces, including those received in error.
ipInHeaderError	The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity (the switch).
ipInDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting re-assembly.

Link statistics

Command: `/stats/port <port number>/link`

```
Link statistics for port 1:
linkStateChange:              2
```

The following table describes the link statistics for a selected port:

Table 51 Link statistics for port

Statistic	Description
linkStateChange	The total number of link state changes.

Port RMON statistics

Command: `/stats/port <port number>/rmon`

```
RMON statistics for port 1:
etherStatsDropEvents:                       NA
etherStatsOctets:                            0
etherStatsPkts:                              0
etherStatsBroadcastPkts:                     0
etherStatsMulticastPkts:                     0
etherStatsCRCAlignErrors:                    0
etherStatsUndersizePkts:                     0
etherStatsOversizePkts:                      0
etherStatsFragments:                         0
etherStatsJabbers:                           0
etherStatsCollisions:                        0
etherStatsPkts64Octets:                      0
etherStatsPkts65to127Octets:                 0
etherStatsPkts128to255Octets:                0
etherStatsPkts256to511Octets:                0
etherStatsPkts512to1023Octets:               0
etherStatsPkts1024to1518Octets:              0
```

The following table describes the Remote Monitoring (RMON) statistics of the selected port:

Table 52 RMON statistics

Statistic	Description
etherStatsDropEvents	The total number of packets received that were dropped because of system resource constraints.
etherStatsOctets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
etherStatsPkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
etherStatsBroadcastPkts	The total number of good packets received that were directed to the broadcast address.
etherStatsMulticastPkts	The total number of good packets received that were directed to a multicast address.
etherStatsCRCAlignErrors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatsUndersizePkts	The total number of packets received that were less than 64 octets long (excluding framing bits but including FCS octets) and were otherwise well formed.
etherStatsOversizePkts	The total number of packets received that were longer than 1518 octets (excluding framing bits but including FCS octets) and were otherwise well formed.
etherStatsFragments	The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatsJabbers	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Jabber is defined as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.
etherStatsCollisions	The best estimate of the total number of collisions on this Ethernet segment.
etherStatsPkts64 Octets	The total number of packets (including bad packets) received that were less than or equal to 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127 Octets	The total number of packets (including bad packets) received that were greater than 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts128to255 Octets	The total number of packets (including bad packets) received that were greater than 127 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts256to511 Octets	The total number of packets (including bad packets) received that were greater than 255 octets in length (excluding framing bits but including FCSoctets).
etherStatsPkts512to1023 Octets	The total number of packets (including bad packets) received that were greater than 511 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts1024to1518 Octets	The total number of packets (including bad packets) received that were greater than 1023 octets in length (excluding framing bits but including FCS octets).

Layer 2 statistics

Command: `/stats/l2`

```
[Layer 2 Statistics Menu]
     fdb      - Show FDB stats
     lacp     - Show LACP stats
```

The following table describes the Layer 2 statistics menu options.

Table 53 Layer 2 statistics menu options

Command	Usage
`fdb`	Displays the Forwarding Database statistics.
`lacp`	Displays the Link Aggregation Control Protocol (LACP) statistics.

FDB statistics

Command: `/stats/l2/fdb`

```
FDB statistics:
 current:            91   hiwat:               91
```

This menu option enables you to display statistics regarding the use of the forwarding database, including the number of current entries and the maximum number of entries ever recorded.

The following table describes the Forwarding Database (FDB) statistics:

Table 54 Forwarding Database statistics

Statistic	Description
`current`	Current number of entries in the Forwarding Database.
`hiwat`	Highest number of entries recorded at any given time in the Forwarding Database.

LACP statistics

Command: `/stats/l2/lacp <port number> <clear>`

```
Valid LACPDUs received         - 0
Valid Marker PDUs received     - 0
Valid Marker Rsp PDUs received - 0
Unknown version/TLV type       - 0
Illegal subtype received       - 0
LACPDUs transmitted            - 0
Marker PDUs transmitted        - 0
Marker Rsp PDUs transmitted    - 0
```

Layer 3 statistics

Command: `/stats/l3`

```
[Layer 3 Statistics Menu]
     geal3    - GEA Layer 3 Stats Menu
     ip       - Show IP stats
     route    - Show route stats
     arp      - Show ARP stats
     dns      - Show DNS stats
     icmp     - Show ICMP stats
     tcp      - Show TCP stats
     udp      - Show UDP stats
     igmp     - Show IGMP stats
     ospf     - OSPF stats
     vrrp     - Show VRRP stats
     clvrrp   - Clear VRRP stats
     igmpgrps - Total number of IGMP groups
     ipmcgrps - Total number of IPMC groups
     clrigmp  - Clear IGMP stats
     ipclear  - Clear IP stats
     ripclear - Clear RIP stats
     ospfclear - Clear all OSPF stats
     dump     - Dump layer 3 stats
```

The following table describes the Layer 3 statistics menu options.

Table 55 Layer 3 statistics menu options

Command	Usage
`geal3`	Displays the GEA statistics menu.
`ip`	IP statistics.
`route`	Displays route statistics.
`arp <clear>`	Displays Address Resolution Protocol (ARP) statistics. Add the argument, clear, to clear ARP statistics.
`dns`	Displays Domain Name System (DNS) statistics.
`icmp`	Displays ICMP statistics.
`tcp`	Displays Transmission Control Protocol (TCP) statistics. Add the argument, clear, to clear TCP statistics.
`udp`	Displays User Datagram Protocol (UDP) statistics. Add the argument, clear, to clear UDP statistics.
`igmp`	Displays IGMP statistics.
`ospf`	Displays OSPF statistics menu.
`vrrp`	When virtual routers are configured, you can display the following • Advertisements received (vrrpInAdvers) • Advertisements transmitted (vrrpOutAdvers) • Advertisements received, but ignored (vrrpBadAdvers)
`clrvrrp`	Clears all VRRP statistics.
`rip`	Displays Routing Information Protocol (RIP) statistics
`igmpgrps`	Displays the total number of Internet Group Management Protocol (IGMP) groups registered the switch.
`ipmcgrps`	Displays the total number of Internet Protocol Multicast (IPMC) groups registered on the switch.
`clrigmp <1-4095>|all`	Clears all IGMP statistics for the selected VLANs.
`ipclear`	Clears IP statistics. Use this command with caution as it will delete all the IP statistics.
`dump`	Displays all Layer 3 statistics.

GEA Layer 3 statistics menu

Command: `/stats/l3/gea13`

```
[GEA Layer 3 Statistics Menu]
     l3bucket - Show GEA L3 bucket for an IP address
     dump     - Dump GEA layer 3 stats counter
```

The following table describes the Layer 3 GEA statistics menu options.

Table 56 Layer 3 GEA statistics menu options

Command	Usage
`l3bucket`	Displays GEA statistics for a specific IP address.
`Dump`	Displays all GEA statistics.

GEA Layer 3 statistics

Command: `/stats/l3/gea13/dump`

```
GEA L3 statistics:
         Max L3 table size                 : 4096
         Number of L3 entries used         : 4

         Max LPM table size                : 512
         Number of LPM entries used        : 1
```

IP statistics

Command: `/stats/l3/ip`

```
IP statistics:
ipInReceives: 36475            ipInHdrErrors: 0
ipInAddrErrors: 905
ipInUnknownProtos: 0           ipInDiscards: 0
ipInDelivers: 4103             ipOutRequests: 30974
ipOutDiscards: 0
ipDefaultTTL: 255
```

The following table describes the IP statistics:

Table 57 IP statistics

Statistics	Description
`ipInReceives`	The total number of input datagrams received from interfaces, including those received in error.
`ipInHdrErrors`	The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on.
`ipInAddrErrors`	The number of input datagrams discarded because the IP address in their IP header destination field was not a valid address to be received at this switch. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported classes (for example, Class E). For entities which are not IP gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
`ipInUnknownProtos`	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
`ipInDiscards`	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded This counter does not include any datagrams discarded while awaiting re-assembly.
`ipInDelivers`	The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).

Table 57 IP statistics

Statistics	Description
ipOutRequests	The total number of IP datagrams that local IP user-protocols (including ICMP) supplied to IP in requests for transmission. This counter does not include any datagrams counted in ipForwDatagrams.
ipOutDiscards	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded This counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.
ipDefaultTTL	The default value inserted into the Time-To-Live (TTL) field of the IP header of datagrams originated at this switch, whenever a TTL value is not supplied by the transport layer protocol.

Route statistics

Command: `/stats/l3/route`

```
Route statistics:
ipRoutesCur:               7  ipRoutesHighWater:          7
ipRoutesMax:            1024
```

The following table describes the Route statistics:

Table 58 Route statistics

Statistics	Description
ipRoutesCur	The total number of outstanding routes in the route table.
ipRoutesMax	The maximum number of supported routes.
ipRoutesHighWater	The highest number of routes ever recorded in the route table.

ARP statistics

Command: `/stats/l3/arp`

```
ARP statistics:
arpEntriesCur:             4  arpEntriesHighWater:          6
arpEntriesMax:          4095
```

The following table describes the Address Resolution Protocol (ARP) statistics:

Table 59 ARP statistics

Statistic	Description
arpEntriesCur	The total number of outstanding ARP entries in the ARP table.
arpEntriesMax	The maximum number of ARP entries that are supported.
arpEntriesHighWater	The highest number of ARP entries ever recorded in the ARP table.

DNS statistics

Command: `/stats/l3/dns`

```
DNS statistics:
dnsInRequests:             0  dnsOutRequests:            0
dnsBadRequests:            0
```

The following table describes the Domain Name System (DNS) statistics:

Table 60 DNS statistics

Statistic	Description
dnsInRequests	The total number of DNS request packets that have been received.
dnsOutRequests	The total number of DNS response packets that have been transmitted.
dnsBadRequests	The total number of DNS request packets received that were dropped.

ICMP statistics

Command: `/stats/l3/icmp`

```
ICMP statistics:
icmpInMsgs:                 0   icmpInErrors:                0
icmpInDestUnreachs:         0   icmpInTimeExcds:             0
icmpInParmProbs:            0   icmpInSrcQuenchs:            0
icmpInRedirects:            0   icmpInEchos:                 0
icmpInEchoReps:             0   icmpInTimestamps:            0
icmpInTimestampReps:        0   icmpInAddrMasks:             0
icmpInAddrMaskReps:         0   icmpOutMsgs:            702746
icmpOutErrors:              0   icmpOutDestUnreachs:         0
icmpOutTimeExcds:           0   icmpOutParmProbs:            0
icmpOutSrcQuenchs:          0   icmpOutRedirects:            0
icmpOutEchos:          702746   icmpOutEchoReps:             0
icmpOutTimestamps:          0   icmpOutTimestampReps:        0
icmpOutAddrMasks:           0   icmpOutAddrMaskReps:         0
```

The following table describes the Internet Control Messaging Protocol (ICMP) statistics:

Table 61 ICMP statistics

Statistics	Description
icmpInMsgs	The total number of ICMP messages which the switch received. Note that this counter includes all those counted by icmpInErrors.
icmpInErrors	The number of ICMP messages which the switch received but determined as having ICMP specific errors (for example bad ICMP checksums and bad length).
icmpInDestUnreachs	The number of ICMP Destination Unreachable messages received.
icmpInTimeExcds	The number of ICMP Time Exceeded messages received.
icmpInParmProbs	The number of ICMP Parameter Problem messages received.
icmpInSrcQuenchs	The number of ICMP Source Quench (buffer almost full, stop sending data) messages received.
icmpInRedirects	The number of ICMP Redirect messages received.
icmpInEchos	The number of ICMP Echo (request) messages received.
icmpInEchoReps	The number of ICMP Echo Reply messages received.
icmpInTimestamps	The number of ICMP Timestamp (request) messages received.
icmpInTimestampReps	The number of ICMP Timestamp Reply messages received.
icmpInAddrMasks	The number of ICMP Address Mask Request messages received.
icmpInAddrMaskReps	The number of ICMP Address Mask Reply messages received.
icmpOutMsgs	The total number of ICMP messages which this switch attempted to send. Note that this counter includes all those counted by icmpOutErrors.
icmpOutErrors	The number of ICMP messages that this switch did not send due to problems discovered within ICMP such as a lack of buffer. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no types of errors that contribute to this counter's value.
icmpOutDestUnreachs	The number of ICMP Destination Unreachable messages sent.
icmpOutTimeExcds	The number of ICMP Time Exceeded messages sent.
icmpOutParmProbs	The number of ICMP Parameter Problem messages sent.
icmpOutSrcQuenchs	The number of ICMP Source Quench (buffer almost full, stop sending data) messages sent.
icmpOutRedirects	The number of ICMP Redirect messages sent.
icmpOutEchos	The number of ICMP Echo (request) messages sent.
icmpOutEchoReps	The number of ICMP Echo Reply messages sent.
icmpOutTimestamps	The number of ICMP Timestamp (request) messages sent.
icmpOutTimestampReps	The number of ICMP Timestamp Reply messages sent.
icmpOutAddrMasks	The number of ICMP Address Mask Request messages sent.
icmpOutAddrMaskReps	The number of ICMP Address Mask Reply messages sent.

TCP statistics

Command: `/stats/l3/tcp`

```
TCP statistics:
tcpRtoAlgorithm:         4   tcpRtoMin:               0
tcpRtoMax:          240000   tcpMaxConn:           2048
tcpActiveOpens:          0   tcpPassiveOpens:         0
tcpAttemptFails:         0   tcpEstabResets:          0
tcpInSegs:               0   tcpOutSegs:              0
tcpRetransSegs:          0   tcpInErrs:               0
tcpCurrEstab:            0   tcpCurConn:              5
tcpOutRsts:              0
```

The following table describes the Transmission Control Protocol (TCP) statistics:

Table 62 TCP statistics

Statistics	Description
`tcpRtoAlgorithm`	The algorithm used to determine the timeout value used for retransmitting unacknowledged octets.
`tcpRtoMin`	The minimum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the LBOUND quantity described in Request For Comments (RFC) 793.
`tcpRtoMax`	The maximum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the UBOUND quantity described in RFC 793.
`tcpMaxConn`	The limit on the total number of TCP connections the switch can support.
`tcpActiveOpens`	The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.
`tcpPassiveOpens`	The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.
`tcpAttemptFails`	The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.
`tcpEstabResets`	The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE- WAIT state.
`tcpInSegs`	The total number of segments received, including those received in error. This count includes segments received on currently established connections.
`tcpOutSegs`	The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.
`tcpRetransSegs`	The total number of segments retransmitted, that is, the number of TCP segments transmitted containing one or more previously transmitted octets.
`tcpInErrs`	The total number of segments received in error (for example, bad TCP checksums).
`tcpCurrEstab`	The total number of outstanding memory allocations from heap by TCP protocol stack.
`tcpCurConn`	The total number of outstanding TCP sessions that are currently opened.
`tcpOutRsts`	The number of TCP segments sent containing the reset (RST) flag.

UDP statistics

Command: `/stats/l3/udp`

```
UDP statistics:
udpInDatagrams:          0    udpOutDatagrams:         12
udpInErrors:             0    udpNoPorts:               0
```

The following table describes the User Datagram Protocol (UDP) statistics:

Table 63 UDP statistics

Statistics	Description
udpInDatagrams	The total number of UDP datagrams delivered to the switch.
udpOutDatagrams	The total number of UDP datagrams sent from this switch.
udpInErrors	The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.
udpNoPorts	The total number of received UDP datagrams for which there was no application at the destination port.

IGMP Multicast Group statistics

Command: `/stats/l3/igmp`

```
IGMP Snoop vlan 1 statistics:
-------------------------------------------------------------------
rxIgmpValidPkts:                    0    rxIgmpInvalidPkts:                0
rxIgmpGenQueries:                   0    rxIgmpGrpSpecificQueries:         0
rxIgmpGroupSrcSpecificQueries:      0
rxIgmpLeaves:                       0    rxIgmpReports:                    0
txIgmpReports:                      0    txIgmpGrpSpecificQueries:         0
txIgmpLeaves:                       0    rxIgmpV3CurrentStateRecords:      0
rxIgmpV3SourceListChangeRecords:    0    rxIgmpV3FilterChangeRecords:      0
```

This menu option enables you to display statistics regarding the use of the IGMP Multicast Groups.

The following table describes the IGMP statistics:

Table 64 IGMP statistics

Statistic	Description
rxIgmpValidPkts	Total number of valid IGMP packets received
rxIgmpInvalidPkts	Total number of invalid packets received
rxIgmpGenQueries	Total number of General Membership Query packets received
rxIgmpGrpSpecificQueries	Total number of Membership Query packets received from specific groups
rxIgmpGroupSrcSpecific Queries	Total number of Group Source-Specific Queries (GSSQ) received
rxIgmpLeaves	Total number of Leave requests received
rxIgmpReports	Total number of Membership Reports received
txIgmpReports	Total number of Membership reports transmitted
txIgmpGrpSpecificQueries	Total number of Membership Query packets transmitted to specific groups
txIgmpLeaves	Total number of Leave messages transmitted
rxIgmpV3CurrentState Records	Total number of Current State records received
rxIgmpV3SourceListChange Records	Total number of Source List Change records received
rxIgmpV3FilterChange Records	Total number of Filter Change records received.

OSPF statistics menu

Command: `/stats/l3/ospf`

```
[OSPF stats Menu]
     general  - Show global stats
     aindex   - Show area(s) stats
     if       - Show interface(s) stats
```

The following table describes the OSPF statistics menu options.

Table 65 OSPF statistics menu options

Command	Usage
`general`	Displays OSPF global statistics.
`aindex <0-2>`	Displays area index statistics.
`if <1-249>`	Displays interface statistics.

OSPF global statistics

Command: `/stats/l3/ospf/general`

```
OSPF stats
----------
Rx/Tx Stats:                Rx              Tx
                          --------        --------

Pkts                         0               0
hello                       23             518
database                     4              12
ls requests                  3               1
ls acks                      7               7
ls updates                   9               7
Nbr change stats:                      Intf change Stats:
  hello                        2              up   4
  start                        0              down 2
  n2way                        2              loop 0
  adjoint ok                   2              unloop 0
  negotiation done             2              wait timer 2
  exchange done                2              backup 0
  bad requests                 0              nbr change 5
  bad sequence                 0
  loading done                 2
  n1way                        0
  rst_ad                       0
  down                         1
Timers kickoff
  hello                      514
  retransmit                1028
  lsa lock                     0
  lsa ack                      0
  dbage                        0
  summary                      0
  ase export                   0
```

The following table describes the OSPF global statistics:

Table 66 OSPF global statistics

Statistic	Description
Rx Tx stats:	
Rx Pkts	The sum total of all OSPF packets received on all OSPF areas and interfaces.
Tx Pkts	The sum total of all OSPF packets transmitted on all OSPF areas and interfaces.
Rx Hello	The sum total of all Hello packets received on all OSPF areas and interfaces.
Tx Hello	The sum total of all Hello packets transmitted on all OSPF areas and interfaces.
Rx Database	The sum total of all Database Description packets received on all OSPF areas and interfaces.
Tx Database	The sum total of all Database Description packets transmitted on all OSPF areas and interfaces.
Rx ls Requests	The sum total of all Link State Request packets received on all OSPF areas and interfaces.
Tx ls Requests	The sum total of all Link State Request packets transmitted on all OSPF areas and interfaces.
Rx ls Acks	The sum total of all Link State Acknowledgement packets received on all OSPF areas and interfaces.
Tx ls Acks	The sum total of all Link State Acknowledgement packets transmitted on all OSPF areas and interfaces.
Rx ls Updates	The sum total of all Link State Update packets received on all OSPF areas and interfaces.
Tx ls Updates	The sum total of all Link State Update packets transmitted on all OSPF areas and interfaces.
Nbr change stats:	
hello	The sum total of all Hello packets received from neighbors on all OSPF areas and interfaces.
Start	The sum total number of neighbors in this state (that is, an indication that Hello packets should now be sent to the neighbor at intervals of `HelloInterval` seconds) across all OSPF areas and interfaces.
n2way	The sum total number of bidirectional communication establishment between this router and other neighboring routers.
adjoint ok	The sum total number of decisions to be made (again) as to whether an adjacency should be established/maintained with the neighbor across all OSPF areas and interfaces.
negotiation done	The sum total number of neighbors in this state wherein the Master/slave relationship has been negotiated, and sequence numbers have been exchanged, across all OSPF areas and interfaces.
exchange done	The sum total number of neighbors in this state (that is, in an adjacency's final state) having transmitted a full sequence of Database Description packets, across all OSPF areas and interfaces.
bad requests	The sum total number of Link State Requests which have been received for a link state advertisement not contained in the database across all interfaces and OSPF areas.

Table 66 OSPF global statistics

Statistic	Description
bad sequence	The sum total number of Database Description packets which have been received that either: a) Has an unexpected DD sequence number b) Unexpectedly has the init bit set c) Has an options field differing from the last Options field received in a Database Description packet.
loading done	The sum total number of link state updates received for all out-of-date portions of the database across all OSPF areas and interfaces.
n1way	The sum total number of Hello packets received from neighbors, in which this router is not mentioned across all OSPF interfaces and areas.
rst_ad	The sum total number of times the Neighbor adjacency has been reset across all OPSF areas and interfaces.
down	The total number of Neighboring routers down (that is, in the initial state of a neighbor conversation) across all OSPF areas and interfaces.
Intf Change Stats:	
up	The sum total number of interfaces up in all OSPF areas.
down	The sum total number of interfaces down in all OSPF areas.
loop	The sum total of interfaces no longer connected to the attached network across all OSPF areas and interfaces.
unloop	The sum total number of interfaces, connected to the attached network in all OSPF areas.
wait timer	The sum total number of times the Wait Timer has been fired, indicating the end of the waiting period that is required before electing a (Backup) Designated Router across all OSPF areas and interfaces.
backup	The sum total number of Backup Designated Routers on the attached network for all OSPF areas and interfaces.
nbr change	The sum total number of changes in the set of bidirectional neighbors associated with any interface across all OSPF areas.
Timers Kickoff:	
hello	The sum total number of times the Hello timer has been fired (which triggers the send of a Hello packet) across all OPSF areas and interfaces.
retransmit	The sum total number of times the Retransmit timer has been fired across all OPSF areas and interfaces.
lsa lock	The sum total number of times the Link State Advertisement (LSA) lock timer has been fired across all OSPF areas and interfaces.
lsa ack	The sum total number of times the LSA Ack timer has been fired across all OSPF areas and interfaces.
dbage	The total number of times the data base age (Dbage) has been fired.
summary	The total number of times the Summary timer has been fired.
ase export	The total number of times the Autonomous System Export (ASE) timer has been fired.

VRRP statistics

Virtual Router Redundancy Protocol (VRRP) support on the switch provides redundancy between routers in a LAN. This is accomplished by configuring the same virtual router IP address and ID number on each participating VRRP-capable routing device.

One of the virtual routers is then elected as the master, based on a number of priority criteria, and assumes control of the shared virtual router IP address. If the master fails, one of the backup virtual routers will assume routing authority and take control of the virtual router IP address.

When virtual routers are configured, you can display the following protocol statistics for VRRP:

- Advertisements received (`vrrpInAdvers`)
- Advertisements transmitted (`vrrpOutAdvers`)
- Advertisements received, but ignored (`vrrpBadAdvers`)

Command: `/stats/l3/vrrp`

```
>> Layer 3 Statistics# vrrp
VRRP statistics:
vrrpInAdvers:               0   vrrpBadAdvers:            0
vrrpOutAdvers:              0
vrrpBadVersion:             0   vrrpBadVrid:              0
vrrpBadAddress:             0   vrrpBadData:              0
vrrpBadPassword:            0   vrrpBadInterval:          0
```

The following table describes the VRRP statistics.

Table 67 VRRP statistics

Field	Description
`vrrpInAdvers`	The total number of VRRP advertisements that have been received.
`vrrpOutAdvers`	The total number of VRRP advertisements that have been sent.
`vrrpBadVersion`	The total number of VRRP advertisements that had a bad version number.
`vrrpBadAddress`	The total number of VRRP advertisements that had a bad address.
`vrrpBadPassword`	The total number of VRRP advertisements that had a bad password.
`vrrpBadAdvers`	The total number of VRRP advertisements received that were dropped.
`vrrpBadVrid`	The total number of VRRP advertisements that had a bad virtual router ID.
`vrrpBadData`	The total number of VRRP advertisements that had bad data.
`vrrpBadInterval`	The total number of VRRP advertisements that had a bad interval.

RIP statistics

Command: `/stats/l3/rip`

```
RIP ALL STATS INFORMATION:
        RIP packets received = 12
        RIP packets sent = 75
        RIP request received = 0
        RIP response received = 12
        RIP request sent = 3
        RIP response sent = 72
        RIP route timeout = 0
        RIP bad size packet received = 0
        RIP bad version received = 0
        RIP bad zeros received = 0
        RIP bad src port received = 0
        RIP bad src IP received = 0
        RIP packets from self received = 0
```

The following table describes the basic Routing Information Protocol (RIP) statistics :

Table 68 RIP Statistics

Statistics	Description
RIP packets received	The total number of RIP packets received.
RIP packets sent	The total number of RIP packets transmitted.
RIP request received	The total number of RIP requests received.
RIP response received	The total number of RIP response received.
RIP request sent	The total number of RIP requests transmitted.
RIP response sent	The total number of RIP responses transmitted.
RIP route timeout	The total number of RIP route timeouts.
RIP bad size packet received	The total number of bad size RIP packets received.
RIP bad version received	The total number of RIP bad versions received.
RIP bad zeros received	The total number of RIP bad zeros (RIPv1 packets with non-zero unused fields) received.
RIP bad source port received	The total number of RIP bad source port received.
RIP bad source IP received	The total number of RIP bad source IP received.
RIP packets from self received	The total number of RIP packets from self received.

Management Processor statistics

Command: `/stats/mp`

```
[MP-specific Statistics Menu]
      pkt     - Show Packet stats
      tcb     - Show All TCP control blocks in use
      ucb     - Show All UDP control blocks in use
      cpu     - Show CPU utilization
```

The following table describes the MP-specific Statistics Menu options:

Table 69 MP-specific Statistics Menu

Command	Usage
pkt	Displays packet statistics, to check for leads and load.
tcb	Displays all Transmission Control Protocol (TCP) control blocks (TCB) that are in use.
ucb	Displays all User Datagram Protocol (UDP) control blocks (UCB) that are in use.
cpu	Displays CPU utilization for periods of up to 1, 4, and 64 seconds.

Packet statistics

Command: `/stats/mp/pkt`

```
Packet counts:
 allocs:       1174328     frees:                    1174326
 mediums:            0     mediums hi-watermark:          10
 jumbos:             0     jumbos hi-watermark:            0
 smalls:             2     smalls hi-watermark:            3
 failures:           0
```

The following table describes the packet statistics.

Table 70 MP specific packet statistics

Description	Example statistic
allocs	Total number of packet allocations from the packet buffer pool by the TCP/IP protocol stack.
frees	Total number of times the packet buffers are freed (released) to the packet buffer pool by the TCP/IP protocol stack.
mediums	Total number of packet allocations with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
mediums hi-watermark	The highest number of packet allocation with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
jumbos	Total number of packet allocations with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
jumbos hi-watermark	The highest number of packet allocation with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
smalls	Total number of packet allocations with size less than 128 bytes from the packet buffer pool by the TCP/IP protocol stack.
smalls hi-watermark	The highest number of packet allocation with size less than 128 bytes from the packet buffer pool by the TCP/IP protocol stack.
failures	Total number of packet allocation failures from the packet buffer pool by the TCP/IP protocol stack.

TCP statistics

Command: `/stats/mp/tcb`

```
All TCP allocated control blocks:
10ad41e8:  0.0.0.0             0 <=> 0.0.0.0            80  listen
10ad5790:  47.81.27.5       1171 <=> 47.80.23.243       23  established
```

The following table describes the Transmission Control Protocol (TCP) control block (TCB) statistics shown in this example:

Table 71 TCP statistics

Description	Example statistic
Memory	`10ad41e8/10ad5790`
Destination IP address	`0.0.0.0/47.81.27.5`
Destination port	`0/1171`
Source IP	`0.0.0.0/47.80.23.243`
Source port	`80/23`
State	`listen/established`

UDP statistics

Command: `/stats/mp/ucb`

```
All UDP allocated control blocks:
  161:  listen
```

The following table describes the User Datagram Protocol (UDP) control block (UCB) statistics shown in this example:

Table 72 UDP statistics

Description	Example Statistic
Control block	`161`
State	`listen`

CPU statistics

Command: `/stats/mp/cpu`

```
CPU utilization:
cpuUtil1Second:            8%
cpuUtil4Seconds:           9%
cpuUtil64Seconds:          8%
```

The following table describes the management port CPU utilization statistics:

Table 73 CPU statistics

Statistics	Description
`cpuUtil1Second`	The utilization of MP CPU over 1 second. This is shown as a percentage.
`cpuUtil4Seconds`	The utilization of MP CPU over 4 seconds. This is shown as a percentage.
`cpuUtil64Seconds`	The utilization of MP CPU over 64 seconds. This is shown as a percentage.

Access Control List (ACL) statistics menu

Command: `/stats/acl`

```
[ACL Menu]
     acl      - Display ACL stats
     dump     - Display all available ACL stats
     clracl   - Clear ACL stats
```

The following table describes the Access Control List (ACL) Statistics menu options:

Table 74 ACL statistics menu options

Command	Usage
`acl <1-384>`	Displays the Access Control List Statistics for a specific ACL.
`dump`	Displays all ACL statistics.
`clracl`	Clear all ACL statistics.

ACL statistics

Command: `/stats/acl/dump`

```
Hits for ACL 1: 26057515
Hits for ACL 2: 26057497
```

SNMP statistics

Command: `/stats/snmp`

```
SNMP statistics:
snmpInPkts:              282392   snmpInBadVersions:              0
snmpInBadC'tyNames:           0   snmpInBadC'tyUses:              0
snmpInASNParseErrs:           0   snmpEnableAuthTraps:            2
snmpOutPkts:             282392   snmpInBadTypes:                 0
snmpInTooBigs:                0   snmpInNoSuchNames:              0
snmpInBadValues:              0   snmpInReadOnlys:                0
snmpInGenErrs:                0   snmpInTotalReqVars:        564784
snmpInTotalSetVars:           0   snmpInGetRequests:         282392
snmpInGetNexts:               0   snmpInSetRequests:              0
snmpInGetResponses:           0   snmpInTraps:                    0
snmpOutTooBigs:               0   snmpOutNoSuchNames:             0
snmpOutBadValues:             0   snmpOutReadOnlys:               0
snmpOutGenErrs:               0   snmpOutGetRequests:             0
snmpOutGetNexts:              0   snmpOutSetRequests:             0
snmpOutGetResponses:     282392   snmpOutTraps:                   0
snmpSilentDrops:              0   snmpProxyDrops:                 0
```

The following table describes the Simple Network Management Protocol (SNMP) statistics:

Table 75 SNMP statistics

Statistics	Description
`snmpInPkts`	The total number of messages delivered to the SNMP entity from the transport service.
`snmpInBadVersions`	The total number of SNMP messages, which were delivered to the SNMP protocol entity and were for an unsupported SNMP version.
`snmpInBadC'tyNames`	The total number of SNMP messages delivered to the SNMP entity that used an SNMP community name not known to the switch.
`snmpInBadC'tyUses`	The total number of SNMP messages delivered to the SNMP protocol entity that represented an SNMP operation which was not allowed by the SNMP community named in the message.
`snmpInASNParseErrs`	The total number of ASN.1 (Abstract Syntax Notation One) or BER (Basic Encoding Rules), errors encountered by the SNMP protocol entity when decoding SNMP messages received. The Open Systems Interconnection (OSI) method of specifying abstract objects is called ASN.1 (Abstract Syntax Notation One, defined in X.208), and one set of rules for representing such objects as strings of ones and zeros is called the BER (Basic Encoding Rules, defined in X.209). ASN.1 is a flexible notation that allows one to define a variety of data types, from simple types such as integers and bit strings to structured types such as sets and sequences. BER describes how to represent or encode values of each ASN.1 type as a string of eight-bit octets.
`snmpEnableAuthTraps`	An object to enable or disable the authentication traps generated by this switch.
`snmpOutPkts`	The total number of SNMP messages which were passed from the SNMP protocol entity to the transport service.
`snmpInBadTypes`	The total number of SNMP messages which failed ASN.1 parsing.
`snmpInTooBigs`	The total number of SNMP Protocol Data Units (PDUs) that were delivered to the SNMP protocol entity and for which the value of the error-status field is too big.

Table 75 SNMP statistics

Statistics	Description
snmpInNoSuchNames	The total number of SNMP Protocol Data Units (PDUs) that were delivered to the SNMP protocol entity and for which the value of the error-status field is noSuchName.
snmpInBadValues	The total number of SNMP Protocol Data Units (PDUs) that were delivered to the SNMP protocol entity and for which the value of the error-status field is badValue.
snmpInReadOnlys	The total number of valid SNMP Protocol Data Units (PDUs), which were delivered to the SNMP protocol entity and for which the value of the error-status field is read-only.
snmpInGenErrs	The total number of SNMP Protocol Data Units (PDUs), which were delivered to the SNMP protocol entity and for which the value of the error-status field is genErr.
snmpInTotalReqVars	The total number of MIB objects which have been retrieved successfully by the SNMP protocol entity as a result of receiving valid SNMP Get-Request and Get-Next Protocol Data Units (PDUs).
snmpInTotalSetVars	The total number of MIB objects, which have been altered successfully by the SNMP protocol entity as a result of receiving valid SNMP Set-Request Protocol Data Units (PDUs).
snmpInGetRequests	The total number of SNMP Get-Request Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInGetNexts	The total number of SNMP Get-Next Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInSetRequests	The total number of SNMP Set-Request Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInGetResponses	The total number of SNMP Get-Response Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInTraps	The total number of SNMP Trap Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpOutTooBigs	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is too big.
snmpOutNoSuchNames	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status is noSuchName.
snmpOutBadValues	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is badValue.
snmpOutReadOnlys	Not in use.
snmpOutGenErrs	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is genErr.
snmpOutGetRequests	The total number of SNMP Get-Request Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutGetNexts	The total number of SNMP Get-Next Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutSetRequests	The total number of SNMP Set-Request Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutGetResponses	The total number of SNMP Get-Response Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutTraps	The total number of SNMP Trap Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpSilentDrops	The total number of GetRequest-PDUs, GetNextRequest-PDUs, GetBulkRequest-PDUs, SetRequest-PDUs, and InformRequest-PDUs delivered to the SNMP entity which were silently dropped because the size of a reply containing an alternate Response-PDU with an empty variable-bindings field was too large.
snmpProxyDrops	The total number of GetRequest-PDUs, GetNextRequest-PDUs,GetBulkRequest-PDUs, SetRequest-PDUs, and InformRequest-PDUs delivered to the SNMP entity which were silently dropped because the transmission of the message to a proxy target failed in a manner (other than a time-out) such that no Response-PDU could be returned.

NTP statistics

Command: `/stats/ntp`

```
NTP statistics:
        Primary Server via mgt port:
                Requests Sent:              0
                Responses Received:         0
                Updates:                    0
        Secondary Server via mgt port:
                Requests Sent:              0
                Responses Received:         0
                Updates:                    0
```

The switch uses NTP (Network Timing Protocol) version 3 to synchronize the switch's internal clock with an atomic time-calibrated NTP server. With NTP enabled, the switch can accurately update its internal clock to be consistent with other devices on the network and generates accurate syslogs.

The following table describes the NTP statistics:

Table 76 NTP statistics

Statistics	Description
`Primary Server`	Requests Sent: The total number of NTP requests the switch sent to the primary NTP server to synchronize time. Responses Received: The total number of NTP responses received from the primary NTP server. Updates: The total number of times the switch updated its time based on the NTP responses received from the primary NTP server.
`Secondary Server`	Requests Sent: The total number of NTP requests the switch sent to the secondary NTP server to synchronize time. Responses Received: The total number of NTP responses received from the secondary NTP server. Updates: The total number of times the switch updated its time based on the NTP responses received from the secondary NTP server.

Uplink Failure Detection (UFD) statistics

This menu option allows you to display Uplink Failure Detection (UFD) statistics. To reset UFD statistics, follow the command `/stats/ufd` with the following argument: `clear`.

Command: `/stats/ufd <clear>`

```
Uplink Failure Detection statistics:
FDP number: 1
Number of times LtM link failure: 1
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 1
FDP number: 2
Number of times LtM link failure: 0
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 0
FDP number: 3
Number of times LtM link failure: 0
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 0
FDP number: 4
Number of times LtM link failure: 0
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 0
```

The following table describes the Uplink Failure Detection (UFD) statistics:

Table 77 Uplink Failure Detection statistics

Statistic	Description
`Number of times LtM link failure`	The total numbers of times that link failures were detected on the uplink ports in the Link to Monitor group.
`Number of times LtM link in Blocking State`	The total number of times that Spanning Tree Blocking state was detected on the uplink ports in the Link to Monitor group.
`Number of times LtD got auto disabled`	The total numbers of times that downlink ports in the Link to Disable group were automatically disabled because of a failure in the Link to Monitor group.

Statistics dump

Command: `/stats/dump`

Use the **dump** command to dump all switch statistics available from the Statistics Menu (40K or more, depending on your configuration).

Configuration Menu

Introduction

The Configuration Menu is only available from an administrator login. It includes submenus for configuring every aspect of the switch. Changes to configuration are not active until explicitly applied. Changes can be saved to non-volatile memory (NVRAM).

Menu information

Command: `/cfg`

```
[Configuration Menu]
     sys      - System-wide Parameter Menu
     port     - Port Menu
     l2       - Layer 2 Menu
     l3       - Layer 3 Menu
     qos      - QOS Menu
     acl      - Access Control List Menu
     rmon     - RMON Menu
     pmirr    - Port Mirroring Menu
     ufd      - Uplink Failure Detection Menu
     dump     - Dump current configuration to script file
     ptcfg    - Backup current configuration to FTP/TFTP server
     gtcfg    - Restore current configuration from FTP/TFTP server
     cur      - Display current configuration
```

The following table describes the Configuration Menu options.

Table 78 Configuration Menu options

Command	Usage
`sys`	Displays the System Configuration Menu.
`port <port number>`	Displays the Port Configuration Menu.
`l2`	Displays the Layer 2 Configuration Menu.
`l3`	Displays the Layer 3 Configuration Menu.
`qos`	Displays the Quality of Service Configuration Menu.
`acl`	Displays the Access Control List Configuration Menu.
`rmon`	Displays the RMON Configuration Menu.
`pmirr`	Displays the Mirroring Configuration Menu.
`ufd`	Displays the Uplink Failure Detection Configuration Menu.
`dump`	Dumps current configuration to a script file.
`ptcfg <host name or IP address of FTP/TFTP server> <filename on host>`	Backs up current configuration to FTP/TFTP server.
`gtcfg <host name or IP address of FTP/TFTP server> <filename on host>`	Restores current configuration from FTP/TFTP server.
`cur`	Displays the current configuration parameters.

Viewing, applying, reverting, and saving changes

As you use the configuration menus to set switch parameters, the changes you make do not take effect immediately. All changes are considered pending until you explicitly apply them. Also, any changes are lost the next time the switch boots unless the changes are explicitly saved.

While configuration changes are in the pending state, you can:

- View the pending changes
- Apply the pending changes
- Revert to restore configuration parameters set with the last apply command
- Save the changes to flash memory

Viewing pending changes

You can view all pending configuration changes by entering `diff` at any CLI prompt:

```
# diff
```

You can view all pending configuration changes that have been applied but not saved to flash memory by entering `diff flash` at any CLI prompt:

```
# diff flash
```

Applying pending changes

To make your configuration changes active, you must apply them. To apply configuration changes, enter the following command at any prompt:

```
# apply
```

NOTE: All configuration changes take effect immediately when applied.

Reverting changes

The **revert** command removes configuration changes that have been made, but not applied. Enter `revert apply` to remove all changes that have not been saved:

```
# revert
```

Saving the configuration

In addition to applying the configuration changes, you can save them to flash memory on the switch.

IMPORTANT: If you do not save the changes, they will be lost the next time the system is rebooted.

To save the new configuration, enter the following command at any prompt:

```
# save
```

When you save configuration changes, the changes are saved to the active configuration block. The configuration being replaced by the save is first copied to the backup configuration block. If you do not want the previous configuration block copied to the backup configuration block, enter the following instead:

```
# save n
```

You can decide which configuration you want to run the next time you reset the switch. Your options include:

- The active configuration block
- The backup configuration block
- Factory default configuration block

You can view all pending configuration changes that have been applied but not saved to flash memory using the **diff flash** command. It is a global command that can be executed from any prompt.

For instructions on selecting the configuration to run at the next system reset, see the "Selecting a configuration block" section in the "Boot Options Menu" chapter.

Reminders

CLI reminders prompt users to complete configuration tasks that require multiple steps. The default setting for CLI reminders is `enabled`. Use the following command to disable CLI reminders: `/cfg/sys/reminders dis`

The following is an example of a configuration task performed with CLI reminders enabled.

```
>> Layer 2# vlan 5
VLAN number 5 with name "VLAN 5" created.
Reminder: VLAN 5 needs to be enabled.
>> VLAN 5# add 9
Port 9 is an UNTAGGED port and its current PVID is 1.
Confirm changing PVID from 1 to 5 [y/n]: y
Current ports for VLAN 5:        empty
Pending new ports for VLAN 5:    9
Reminder: Port 9 needs to be enabled.
Reminder: VLAN 5 needs to be enabled.
```

System configuration

Command: `/cfg/sys`

```
[System Menu]
     syslog    - Syslog Menu
     sshd      - SSH Server Menu
     radius    - RADIUS Authentication Menu
     tacacs+   - TACACS+ Authentication Menu
     ntp       - NTP Server Menu
     ssnmp     - System SNMP Menu
     access    - System Access Menu
     date      - Set system date
     time      - Set system time
     timezone  - Set system timezone
     olddst    - Set system DST for US
     dlight    - Set system daylight savings
     idle      - Set timeout for idle CLI sessions
     notice    - Set login notice
     bannr     - Set login banner
     hprompt   - Enable/disable display hostname (sysName) in CLI prompt
     bootp     - Enable/disable use of BOOTP
     dhcp      - Enable/disable use of DHCP on Mgmt interface
     reminders - Enable/disable Reminders
     cur       - Display current system-wide parameters
```

This menu provides configuration of switch management parameters such as user and administrator privilege mode passwords, browser-based management settings, and management access list.

The following table describes the System Configuration Menu options.

Table 79 System Configuration Menu options

Command	Usage
`syslog`	Displays the Syslog Menu.
`sshd`	Displays the SSH Server Menu.
`radius`	Displays the RADIUS Authentication Menu.
`tacacs+`	Displays the TACACS+ AuthenticationMenu.
`ntp`	Displays the Network Time Protocol (NTP) Server Menu.
`ssnmp`	Displays the System SNMP Menu.
`access`	Displays the System Access Menu.
`date`	Prompts the user for the system date.
`time`	Configures the system time using a 24-hour clock format.
`timezone`	Configures the time zone where the switch resides. You are prompted to select your location (continent, country, region) by the timezone wizard.
`olddst disable|enable`	Enables or disables use of the Daylight Saving Time (DST) rules in effect prior to the year 2007. The default value is `disabled`.
`dlight disable|enable`	Disables or enables daylight saving time in the system clock. When enabled, the switch will add an extra hour to the system clock so that it is consistent with the local clock. By default, this option is disabled.
`idle <1-60>`	Sets the idle timeout for CLI sessions, from 1 to 60 minutes. The default is 5 minutes. This setting affects both the console port and Telnet port.
`notice <1-1024 character multi-line> <'-' to end>`	Displays login notice immediately before the "Enter password:" prompt. This notice can contain up to 1024 characters and new lines.
`bannr <1-80 characters>`	Configures a login banner of up to 80 characters. When a user or administrator logs into the switch, the login banner is displayed.
`hprompt disable|enable`	Enables or disables displaying of the host name (system administrator's name) in the command line interface.
`bootp disable|enable`	Enables or disables the use of BOOTP. If you enable BOOTP, the switch will query its BOOTP server for all of the switch IP parameters. The default value is `enabled`.
`dhcp disable|enable`	Enables or disables Dynamic Host Control Protocol for setting the management IP address on interface 256. When enabled, the IP address obtained from the DHCP server overrides the static IP address. The default value is `enabled`.
`reminders disable|enable`	Enables or disables reminder messages in the CLI. The default value is `enabled`.
`cur`	Displays the current system parameters.

System host log configuration

Command: `/cfg/sys/syslog`

```
[Syslog Menu]
     host     - Set IP address of first syslog host
     host2    - Set IP address of second syslog host
     sever    - Set the severity of first syslog host
     sever2   - Set the severity of second syslog host
     facil    - Set facility of first syslog host
     facil2   - Set facility of second syslog host
     console  - Enable/disable console output of syslog messages
     log      - Enable/disable syslogging of features
     cur      - Display current syslog settings
```

The following table describes the Syslog Configuration Menu options.

Table 80 Syslog Configuration Menu options

Command	Description
`host <IP address> <-mgt|-data>`	Sets the IP address of the first syslog host. For example, 100.10.1.1
`host2 <IP address> <-mgt|-data>`	Sets the IP address of the second syslog host. For example, 100.10.1.2
`sever <0-7>`	Sets the severity level of the first syslog host displayed. The default is 7, which means log all the severity levels.
`sever2 <0-7>`	Sets the severity level of the second syslog host displayed. The default is 7, which means log all the severity levels.
`facil <0-7>`	This option sets the facility level of the first syslog host displayed. The range is 0-7. The default is 0.
`facil2 <0-7>`	This option sets the facility level of the second syslog host displayed. The range is 0-7. The default is 0.
`console disable|enable`	Enables or disables delivering syslog messages to the console. When necessary, disabling console ensures the switch is not affected by syslog messages. It is enabled by default.
`log <feature|all> <enable|disable>`	Displays a list of features for which syslog messages can be generated. You can choose to enable/disable specific features or enable/disable syslog on all available features. Features include: • console • system • mgmt • cli • stg • vlan • ssh • vrrp • ntp • ip • web • ospf • rmon • ufd • 802.1x • cfg
`cur`	Displays the current syslog settings.

Secure Shell Server configuration

Command: `/cfg/sys/sshd`

```
[SSHD Menu]
      interval- Set Interval for generating the RSA server key
      scpadm  - Set SCP-only admin password
      hkeygen - Generate the RSA host key
      skeygen - Generate the RSA server key
      sshport - Set SSH server port number
      ena     - Enable the SCP apply and save
      dis     - Disable the SCP apply and save
      on      - Turn SSH server ON
      off     - Turn SSH server OFF
      cur     - Display current SSH server configuration
```

Telnet traffic on the network is not secure. This menu enables Secure Shell (SSH) access from any SSH client. The SSH program securely logs into another computer over a network and executes commands in a secure environment. All data using SSH is encrypted.

Secure Shell can be configured on the switch using the console port and Telnet only. The menu options do not display if you access the switch using the Browser-based Interface (BBI).

NOTE: See the *N8406-026 10Gb Intelligent L3 Switch Application Guide* for information on SSH.

The following table describes the **SSHD Configuration Menu** options.

Table 81 SSHD Configuration Menu options

Command	Description
`intrval <0-24>`	Defines interval for auto-generating the RSA server key. The switch will auto-generate the RSA server key at the interval defined in this command. The value of zero (0) means the RSA server key auto-generation is disabled. If the switch has been busy performing any other key generation and the assigned time of interval expires, the RSA server will skip generating the key.
`scpadm`	Defines the administrator password that is for Secure Copy (SCP) only. The username for this SCP administrator is *scpadmin*. Typically, SCP is used to copy files securely from one machine to another. In the switch, SCP is used to download and upload the switch configuration using secure channels.
`hkeygen`	Generates the RSA host keys manually. The switch creates this key automatically while configuring the switch with Secure Shell (SSH). But you can generate the key manually by using this command if you need to overwrite the key for security reasons. The command will take effect immediately without executing the apply command.
`skeygen`	Generates the RSA server key. The switch creates this key automatically while configuring the switch with Secure Shell (SSH). You can generate the key manually by using this command if you need to overwrite the key for security reasons. The command will take effect immediately without executing the apply command.
`sshport <TCP port number>`	Sets the SSH server port number.
`ena`	Enables the SCP apply and save.
`dis`	Disables the SCP apply and save. This is the default for SCP.
`on`	Enables the SSH server.
`off`	Disables the SSH server. This is the default for the SSH server.
`cur`	Displays the current SSH server configuration.

RADIUS server configuration

Command: `/cfg/sys/radius`

```
[RADIUS Server Menu]
    prisrv   - Set primary RADIUS server address
    secsrv   - Set secondary RADIUS server address
    secret   - Set primary RADIUS server secret
    secret2  - Set secondary RADIUS server secret
    port     - Set RADIUS port
    retries  - Set RADIUS server retries
    timeout  - Set RADIUS server timeout
    bckdoor  - Enable/disable RADIUS backdoor for telnet/ssh/http/https
    secbd    - Enable/disable RADIUS secure backdoor for telnet/ssh/http/https
    on       - Turn RADIUS authentication ON
    off      - Turn RADIUS authentication OFF
    cur      - Display current RADIUS configuration
```

NOTE: See the *N8406-026 10Gb Intelligent L3 Switch Application Guide* for information on RADIUS.

The following table describes the RADIUS Server Configuration Menu options.

Table 82 RADIUS Server Configuration Menu options

Command	Description
`prisrv <IP address> <-mgt|-data>`	Sets the primary RADIUS server address.
`secsrv <IP address> <-mgt|-data>`	Sets the secondary RADIUS server address.
`secret <1-32 characters>`	This is the shared secret between the switch and the RADIUS server(s).
`secret2 <1-32 characters>`	This is the secondary shared secret between the switch and the RADIUS server(s).
`port <UDP port number>`	Enter the number of the User Datagram Protocol (UDP) port to be configured, between 1500-3000. The default is 1645.
`retries <1-3>`	Sets the number of failed authentication requests before switching to a different RADIUS server. The range is 1-3 requests The default is 3 requests.
`timeout <1-10>`	Sets the amount of time, in seconds, before a RADIUS server authentication attempt is considered to have failed. The range is 1-10 seconds. The default is 3 seconds.
`bckdoor enable|disable`	Enables or disables the RADIUS back door for telnet/SSH/ HTTP/HTTPS. The default value is disabled. This command does not apply when secure backdoor (`secbd`) is enabled.
`secbd enable|disable`	Enables or disables the RADIUS back door using secure password for telnet/SSH/ HTTP/HTTPS. The default value is disabled. This command does not apply when backdoor (`telnet`) is enabled.
`on`	Enables the RADIUS server.
`off`	Disables the RADIUS server. This is the default.
`cur`	Displays the current RADIUS server parameters.

IMPORTANT: If RADIUS is enabled, you must login using RADIUS authentication when connecting via the console or Telnet/SSH/HTTP/HTTPS. Backdoor for console is always enabled, so you can connect using noradius and the administrator password even if the backdoor (`bckdoor`) or secure backdoor (`secbd`) are disabled.

If Telnet backdoor is enabled (`bckdoor ena`), type in `noradius` as a backdoor to bypass RADIUS checking, and use the administrator password to log into the switch. The switch allows this even if RADIUS servers are available.

If secure backdoor is enabled (`secbd ena`), type in `noradius` as a backdoor to bypass RADIUS checking, and use the administrator password to log into the switch. The switch allows this only if RADIUS servers are not available.

TACACS+ server configuration

Command: `/cfg/sys/tacacs+`

```
[TACACS+ Server Menu]
prisrv  - Set IP address of primary TACACS+ server
secsrv  - Set IP address of secondary TACACS+ server
secret  - Set secret for primary TACACS+ server
secret2 - Set secret for secondary TACACS+ server
port    - Set TACACS+ port number
retries - Set number of TACACS+ server retries
timeout - Set timeout value of TACACS+ server retries
bckdoor - Enable/disable TACACS+ backdoor for telnet/ssh/http/hhtps
secbd   - Enable/disable TACACS+ secure backdoor for telnet/ssh/http/https
cmap    - Enable/disable TACACS+ new privilege level mapping
usermap - Set user privilege mappings
on      - Enable TACACS+ authentication
off     - Disable TACACS+ authentication
cur     - Display current TACACS+ settings
```

TACACS+ (Terminal Access Controller Access Control System) is an authentication protocol that allows a remote access server to forward a user's logon password to an authentication server to determine

whether access can be allowed to a given system. TACACS+ and Remote Authentication Dial-In User Service (RADIUS) protocols are more secure than the TACACS encryption protocol. TACACS+ is described in RFC 1492.

TACACS+ protocol is more reliable than RADIUS, as TACACS+ uses the Transmission Control Protocol (TCP) whereas RADIUS uses the User Datagram Protocol (UDP). Also, RADIUS combines authentication and authorization in a user profile, whereas TACACS+ separates the two operations.

TACACS+ offers the following advantages over RADIUS as the authentication device:

- TACACS+ is TCP-based, so it facilitates connection-oriented traffic.
- It supports full-packet encryption, as opposed to password-only in authentication requests.
- It supports decoupled authentication, authorization, and accounting.

The following table describes the TACACS+ Server Configuration Menu options.

Table 83 TACACS+ Server Configuration Menu options

Command	Description
`prisrv <IP address> <-mgt|-data>`	Defines the primary TACACS+ server address.
`secsrv <IP address> <-mgt|-data>`	Defines the secondary TACACS+ server address.
`secret <1-32 characters>`	This is the shared secret between the switch and the TACACS+ server(s).
`secret2 <1-32 characters>`	This is the secondary shared secret between the switch and the TACACS+ server(s).
`port <TCP port number>`	Enter the number of the TCP port to be configured, between 1 - 65000. The default is 49.
`retries <1-3>`	Sets the number of failed authentication requests before switching to a different TACACS+ server. The range is 1-3 requests. The default is 3 requests.
`timeout <4-15>`	Sets the amount of time, in seconds, before a TACACS+ server authentication attempt is considered to have failed. The range is 4-15 seconds. The default is 5 seconds.
`bckdoor enable|disable`	Enables or disables the TACACS+ back door for telnet. The `telnet` command also applies to SSH/SCP connections and the Browser-based Interface (BBI). The default value is disabled. This command does not apply when secure backdoor (`secbd`) is enabled.
`secbd enable|disable`	Enables or disables the TACACS+ back door using secure password for telnet/SSH/ HTTP/HTTPS. The default value is disabled. This command does not apply when backdoor (`telnet`) is enabled.
`cmap enable|disable`	Enables or disables TACACS+ authorization-level mapping. The default value is `disabled`.
`usermap <0-15> user|oper|admin|none`	Maps a TACACS+ authorization level to this switch user level. Enter a TACACS+ authorization level (0-15), followed by the corresponding this switch user level.
`on`	Enables the TACACS+ server.
`off`	Disables the TACACS+ server. This is the default.
`cur`	Displays current TACACS+ configuration parameters.

IMPORTANT: If TACACS+ is enabled, you must login using TACACS+ authentication when connecting via the console or Telnet/SSH/HTTP/HTTPS. Backdoor for console is always enabled, so you can connect using `notacacs` and the administrator password even if the backdoor (`bckdoor`) or secure backdoor (`secbd`) are disabled.

If Telnet backdoor is enabled (`bckdoor ena`), type in `notacacs` as a backdoor to bypass TACACS+ checking, and use the administrator password to log into the switch. The switch allows this even if TACACS+ servers are available.

If secure backdoor is enabled (`secbd ena`), type in `notacacs` as a backdoor to bypass TACACS+ checking, and use the administrator password to log into the switch. The switch allows this only if TACACS+ servers are not available.

NTP server configuration

Command: `/cfg/sys/ntp`

```
[NTP Server Menu]
     prisrv   - Set primary NTP server address
     secsrv   - Set secondary NTP server address
     intrval  - Set NTP server resync interval
     on       - Turn NTP service ON
     off      - Turn NTP service OFF
     cur      - Display current NTP configuration
```

This menu enables you to synchronize the switch clock to a Network Time Protocol (NTP) server. By default, this option is disabled.

The following table describes the NTP Server Configuration Menu options.

Table 84 NTP Server Configuration Menu options

Command	Description
`prisrv <IP address> mgt|data`	Configures the IP addresses of the primary NTP server to which you want to synchronize the switch clock.
`secsrv <IP address> mgt|data`	Configures the IP addresses of the secondary NTP server to which you want to synchronize the switch clock.
`intrval <1-44640>`	Specifies the interval, that is, how often, in minutes (1-44640), to resynchronize the switch clock with the NTP server. The default is 1440 minutes.
`on`	Enables the NTP synchronization service.
`off`	Disables the NTP synchronization service. This is the default.
`cur`	Displays the current NTP service settings.

System SNMP configuration

Command: `/cfg/sys/ssnmp`

```
[SNMP Menu]
     snmpv3   - SNMPv3 Menu
     name     - Set SNMP "sysName"
     locn     - Set SNMP "sysLocation"
     cont     - Set SNMP "sysContact"
     rcomm    - Set SNMP read community string
     wcomm    - Set SNMP write community string
     timeout  - Set timeout for the SNMP state machine
     auth     - Enable/disable SNMP "sysAuthenTrap"
     linkt    - Enable/disable SNMP link up/down trap
     ufd      - Enable/disable SNMP Uplink Failure Detection trap
     cur      - Display current SNMP configuration
```

The switch software supports SNMP-based network management. In SNMP model of network management, a management station (client/manager) accesses a set of variables known as MIBs (Management Information Base) provided by the managed device (agent). If you are running an SNMP network management station on your network, you can manage the switch using the following standard SNMP MIBs:

- MIB II (RFC 1213)
- Ethernet MIB (RFC 1643)
- Bridge MIB (RFC 1493)

An SNMP agent is a software process on the managed device that listens on UDP port 161 for SNMP messages. Each SNMP message sent to the agent contains a list of management objects to retrieve or to modify.

SNMP parameters that can be modified include:

- System name
- System location
- System contact
- Use of the SNMP system authentication trap function
- Read community string
- Write community string

The following table describes the System SNMP Configuration Menu options.

Table 85 System SNMP Configuration Menu options

Command	Description
`snmpv3`	Displays SNMPv3 menu.
`name <1-64 characters>`	Configures the name for the system. The name can have a maximum of 64 characters.
`locn <1-64 characters>`	Configures the name of the system location. The location can have a maximum of 64 characters.
`cont <1-64 characters>`	Configures the name of the system contact. The contact can have a maximum of 64 characters.
`rcomm <1-32 characters>`	Configures the SNMP read community string. The read community string controls SNMP "get" access to the switch. It can have a maximum of 32 characters. The default read community string is *public*.
`wcomm <1-32 characters>`	Configures the SNMP write community string. The write community string controls SNMP "set" and "get" access to the switch. It can have a maximum of 32 characters. The default write community string is *private*.
`timeout <1-30>`	Sets the timeout value for the SNMP state machine. The range is 1-30 minutes. The default value is 5 minutes.
`auth disable|enable`	Enables or disables the use of the system authentication trap facility. The default setting is disabled.
`linkt <port> disable|enable`	Enables or disables the sending of SNMP link up and link down traps. The default setting is enabled.
`ufd disable|enable`	Enables or disables the sending of Uplink Failure Detection traps. The default setting is disabled.
`cur`	Displays the current SNMP configuration.

SNMPv3 configuration

Command: `/cfg/sys/ssnmp/snmpv3`

```
[SNMPv3 Menu]
     usm       - usmUser Table Menu
     view      - vacmViewTreeFamily Table Menu
     access    - vacmAccess Table Menu
     group     - vacmSecurityToGroup Table Menu
     comm      - community Table Menu
     taddr     - targetAddr Table Menu
     tparam    - targetParams Table Menu
     notify    - notify Table Menu
     v1v2      - Enable/disable V1/V2 access
     cur       - Display current SNMPv3 configuration
```

SNMP version 3 (SNMPv3) is an extensible SNMP Framework that supplements the SNMPv2 Framework by supporting the following:

- a new SNMP message format
- security for messages
- access control
- remote configuration of SNMP parameters

For more details on the SNMPv3 architecture please see RFC2271 to RFC2275.

The following table describes the SNMPv3 Configuration Menu options.

Table 86 SNMPv3 Configuration Menu options

Command	Description
`usm <1-16>`	Configures a user security model (USM) entry for an authorized user. You can also configure this entry through SNMP. The range is 1-16.
`view <1-128>`	Configures different MIB views. The range is 1-128.
`access <1-32>`	Configures access rights. The range is 1-32.
`group <1-16>`	Configures an SNMP group. A group maps the user name to the access group names and their access rights needed to access SNMP management objects. A group defines the access rights assigned to all names that belong to a particular group. The range is 1-16.
`comm <1-16>`	Configures a community table entry. The community table contains objects for mapping community strings and version-independent SNMP message parameters. The range is 1-16.
`taddr <1-16>`	Configures the destination address and user security levels for outgoing notifications. This is also called the transport endpoint. The range is 1-16.
`tparam <1-16>`	Configures SNMP parameters, consisting of message processing model, security model, security level, and security name information. There may be multiple transport endpoints associated with a particular set of SNMP parameters, or a particular transport endpoint may be associated with several sets of SNMP parameters.
`notify <1-16>`	Configures a notification index. A notification application typically monitors a system for particular events or conditions, and generates Notification-Class messages based on these events or conditions. The range is 1-16.
`v1v2 disable|enable`	Enables or disables the access to SNMP version 1 and version 2. This command is enabled by default.
`cur`	Displays the current SNMPv3 configuration.

User Security Model configuration

Command: `/cfg/sys/ssnmp/snmpv3/usm <usm number>`

```
[SNMPv3 usmUser 1  Menu]
     name      - Set USM user name
     auth      - Set authentication protocol
     authpw    - Set authentication password
     priv      - Set privacy protocol
     privpw    - Set privacy password
     del       - Delete usmUser entry
     cur       - Display current usmUser configuration
```

You can make use of a defined set of user identities using this Security Model. An SNMP engine must have the knowledge of applicable attributes of a user.

The following table describes the User Security Model Configuration Menu options.

Table 87 User Security Model Configuration Menu options

Command	Description
`name <1-32 characters>`	Configures a string up to 32 characters long that represents the name of the user. This is the login name that you need in order to access the switch.
`auth md5|sha|none`	Configures the authentication protocol between HMAC-MD5-96 or HMAC-SHA-96. The default algorithm except usmUser 1-2 is `none`.
`authpw`	Configures your password for authentication. If you selected an authentication algorithm using the above command, you need to provide a password; otherwise you will get an error message during validation.
`priv des|none`	Configures the type of privacy protocol on the switch. The privacy protocol protects messages from disclosure. The options are `des` (CBC-DES Symmetric Encryption Protocol) or `none`. If you specify `des` as the privacy protocol, then be sure that you have selected one of the authentication protocols (MD5 or HMAC-SHA-96). If you select `none` as the authentication protocol, you will get an error message.
`privpw`	Configures the privacy password.
`del`	Deletes the USM user entries.
`cur`	Displays the USM user entries.

SNMPv3 View configuration

Command: `/cfg/sys/ssnmp/snmpv3/view <view number>`

```
[SNMPv3 vacmViewTreeFamily 1 Menu]
  name     - Set view name
  tree     - Set MIB subtree(OID) which defines a family of view subtrees
  mask     - Set view mask
  type     - Set view type
  del      - Delete vacmViewTreeFamily entry
  cur      - Display current vacmViewTreeFamily configuration
```

The following table describes the SNMPv3 View Configuration Menu options.

Table 88 SNMPv3 View Configuration Menu options

Command	Description
`name <1-32 characters>`	Defines the name for a family of view subtrees up to a maximum of 32 characters.
`tree <1-64 characters>`	Defines the Object Identifier (OID), a string of maximum 64 characters, which when combined with the corresponding mask defines a family of view subtrees. An example of an OID is `1.3.6.1.2.1.1.1.0`
`mask <1-32 characters>`	Defines the bit mask, which in combination with the corresponding tree defines a family of view subtrees. The mask can have a maximum of 32 characters.
`type included|excluded`	Selects whether the corresponding instances of `vacmViewTreeFamilySubtree` and `vacmViewTreeFamilyMask` define a family of view subtrees, which is included in or excluded from the MIB view.
`del`	Deletes the `vacmViewTreeFamily` group entry.
`cur`	Displays the current `vacmViewTreeFamily` configuration.

View-based Access Control Model configuration

Command: `/cfg/sys/ssnmp/snmpv3/access <access number>`

```
[SNMPv3 vacmAccess 1  Menu]
     name      - Set group name
     model     - Set security model
     level     - Set minimum level of security
     rview     - Set read view index
     wview     - Set write view index
     nview     - Set notify view index
     del       - Delete vacmAccess entry
     cur       - Display current vacmAccess configuration
```

The view-based Access Control Model defines a set of services that an application can use for checking access rights of the user. Access control is needed when the user has to process SNMP retrieval or modification request from an SNMP entity.

The following table describes the User Access Control Configuration Menu options.

Table 89 View-based Access Control Configuration Menu options

Command	Description
`name <1-32 characters>`	Defines the name of the group, up to a maximum of 32 characters.
`model usm|snmpv1|snmpv2`	Selects the security model to be used.
`level noAuthNoPriv|authNoPriv|authPriv`	Defines the minimum level of security required to gain access rights. The level `noAuthNoPriv` means that the SNMP message will be sent without authentication and without using a privacy protocol. The level `authNoPriv` means that the SNMP message will be sent with authentication but without using a privacy protocol. The `authPriv` means that the SNMP message will be sent both with authentication and using a privacy protocol.
`rview <1-32 characters>`	Defines a 32 character long read view name that allows you read access to a particular MIB view. If the value is empty or if there is no active MIB view having this value then no access is granted.
`wview <1-32 characters>`	Defines a 32 character long write view name that allows you write access to the MIB view. If the value is empty or if there is no active MIB view having this value then no access is granted.
`nview <1-32 characters>`	Defines a 32 character long notify view name that allows you notify access to the MIB view.
`del`	Deletes the View-based Access Control entry.
`cur`	Displays the View-based Access Control configuration.

SNMPv3 Group configuration

Command: `/cfg/sys/ssnmp/snmpv3/group <group number>`

```
[SNMPv3 vacmSecurityToGroup 1 Menu]
     model    - Set security model
     uname    - Set USM user name
     gname    - Set group name
     del      - Delete vacmSecurityToGroup entry
     cur      - Display current vacmSecurityToGroup configuration
```

The following table describes the SNMPv3 Group Configuration Menu options.

Table 90 SNMPv3 Group Configuration Menu options

Command	Description
`model usm|snmpv1|snmpv2`	Defines the security model.
`uname <1-32 characters>`	Sets the user name as defined in `/cfg/sys/ssnmp/snmpv3/usm/name`. The user name can have a maximum of 32 characters.
`gname <1-32 characters>`	Configures the name for the access group as defined in `/cfg/sys/ssnmp/snmpv3/access/name`. The group name can have a maximum of 32 characters.
`del`	Deletes the `vacmSecurityToGroup` entry.
`cur`	Displays the current `vacmSecurityToGroup` configuration.

SNMPv3 Community Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/comm <comm number>`

```
[SNMPv3 snmpCommunityTable 1  Menu]
     index    - Set community index
     name     - Set community string
     uname    - Set USM user name
     tag      - Set community tag
     del      - Delete communityTable entry
     cur      - Display current communityTable configuration
```

This command is used for configuring the community table entry. The configured entry is stored in the community table list in the SNMP engine.

The following table describes the SNMPv3 Community Table Configuration Menu options.

Table 91 SNMPv3 Community Table Configuration Menu options

Command	Description
`index <1-32 characters>`	Configures the unique index value of a row in this table. The index can have a maximum of 32 characters.
`name <1-32 characters>`	Defines a readable 32 characters string that represents the corresponding value of an SNMP community name in a security model.
`uname <1-32 characters>`	Defines the name as defined in `/cfg/sys/ssnmp/snmpv3/usm/name`. The name can have a maximum of 32 characters.
`tag <1-255 characters>`	Configures a tag of up to 255 characters maximum. This tag specifies a set of transport endpoints to which a command responder application sends an SNMP trap.
`del`	Deletes the community table entry.
`cur`	Displays the community table configuration.

SNMPv3 Target Address Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/taddr <taddr number>`

```
[SNMPv3 snmpTargetAddrTable 1  Menu]
     name     - Set target address name
     addr     - Set target transport address IP
     port     - Set target transport address port
     taglist  - Set tag list
     pname    - Set targetParams name
     del      - Delete targetAddrTable entry
     cur      - Display current targetAddrTable configuration
```

This menu allows you to configure an entry of a transport address that transmits SNMP traps.

The following table describes the SNMPv3 Target Address Table Configuration Menu options.

Table 92 SNMPv3 Target Address Table Configuration Menu options

Command	Description
`name <1-32 characters>`	Configures the locally arbitrary, but unique identifier, target address name associated with this entry.
`addr <transport address ip>`	Configures a transport address IP that can be used in the generation of SNMP traps.
`port <transport address port>`	Configures a transport address port that can be used in the generation of SNMP traps.
`taglist <1-255 characters>`	Configures a list of tags (up to 255 characters maximum) that are used to select target addresses for a particular operation.
`pname <1-32 characters>`	Defines the name as defined in /cfg/sys/ssnmp/snmpv3/tparam/name.
`del`	Deletes the Target Address Table entry.
`cur`	Displays the current Target Address Table configuration.

SNMPv3 Target Parameters Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/tparam <tparam number>`

```
[SNMPv3 snmpTargetParamsTable 1  Menu]
     name     - Set targetParams name
     mpmodel  - Set message processing model
     model    - Set security model
     uname    - Set USM user name
     level    - Set minimum level of security
     del      - Delete targetParamsTable entry
     cur      - Display current targetParamsTable configuration
```

You can configure the target parameters entry and store it in the target parameters table in the SNMP engine. This table contains parameters that are used to generate a message. The parameters include the message processing model (for example: SNMPv3, SNMPv2c, SNMPv1), the security model (for example: USM), the security name, and the security level (`noAuthnoPriv`, `authNoPriv`, or `authPriv`).

The following table describes the SNMPv3 Target Parameters Table Configuration Menu options.

Table 93 SNMPv3 Target Parameters Table Configuration Menu options

Command	Description
`name <1-32 characters>`	Configures the locally arbitrary, but unique identifier that is associated with this entry.
`mpmodel snmpv1|snmpv2c|snmpv3`	Configures the message processing model that is used to generate SNMP messages.
`model usm|snmpv1|snmpv2`	Selects the security model to be used when generating the SNMP messages.
`uname <1-32 characters>`	Defines the name that identifies the user in the USM table, on whose behalf the SNMP messages are generated using this entry.
`level noAuthNoPriv|authNoPriv|authPriv`	Selects the level of security to be used when generating the SNMP messages using this entry. The level `noAuthNoPriv` means that the SNMP message will be sent without authentication and without using a privacy protocol. The level `authNoPriv` means that the SNMP message will be sent with authentication but without using a privacy protocol. The `authPriv` means that the SNMP message will be sent both with authentication and using a privacy protocol.
`del`	Deletes the `targetParamsTable` entry.
`cur`	Displays the current `targetParamsTable` configuration.

SNMPv3 Notify Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/notify <notify number>`

```
[SNMPv3 snmpNotifyTable 1  Menu]
     name     - Set notify name
     tag      - Set notify tag
     del      - Delete notifyTable entry
     cur      - Display current notifyTable configuration
```

SNMPv3 uses Notification Originator to send out traps. A notification typically monitors a system for particular events or conditions, and generates Notification-Class messages based on these events or conditions.

The following table describes the SNMPv3 Notify Table Configuration menu options.

Table 94 SNMPv3 Notify Table Configuration Menu options

Command	Description
`name <1-32 characters>`	Defines a locally arbitrary but unique identifier associated with this SNMP notify entry.
`tag <1-255 characters>`	Defines a tag of 255 characters maximum that contains a tag value which is used to select entries in the Target Address Table. Any entry in the `snmpTargetAddrTable`, that matches the value of this tag, is selected.
`del`	Deletes the notify table entry.
`cur`	Displays the current notify table configuration.

System Access configuration

Command: `/cfg/sys/access`

```
[System Access Menu]
     mgmt     - Management Network Definition Menu
     user     - User Access Control Menu (passwords)
     http     - Enable/disable HTTP (Web) access
     https    - HTTPS Web Access Menu
     wport    - Set HTTP (Web) server port number
     snmp     - Set SNMP access control
     tsbbi    - Enable/disable telnet/ssh configuration from BBI
     tnet     - Enable/disable Telnet access
     tnport   - Set Telnet server port number
     tport    - Set the TFTP Port for the system
     cur      - Display current system access configuration
```

The following table describes the System Access Configuration menu options.

Table 95 System Access Configuration Menu options

Command	Description
`mgmt`	Displays the Management Configuration Menu.
`user`	Displays the User Access Control Menu.
`http disable|enable`	Enables or disables HTTP (Web) access to the Browser-based Interface. It is enabled by default.
`https`	Displays the HTTPS Menu.
`wport <TCP port number>`	Sets the switch port used for serving switch Web content. The default is HTTP port 80.
`snmp disable|read-only|read-write`	Disables or provides read-only/write-read SNMP access.
`tsbbi enable|disable`	Enables or disables BBI configuration controls for Telnet and SSH. It is disabled by default.
`tnet disable|enable`	Enables or disables telnet server. The default is enabled.
`tnport <TCP port number>`	Sets an optional telnet server port number for cases where the server listens for telnet sessions on a non-standard port.The default is telnet port 23.
`tport <TFTP port number>`	Sets an optional TFTP server port number for cases where the server listens for TFTP sessions on a non-standard port. The default is TFTP port 69.
`cur`	Displays the current system access parameters.

Management Networks configuration

Command: `/cfg/sys/access/mgmt`

```
[Management Networks Menu]
     add      - Add mgmt network definition
     rem      - Remove mgmt network definition
     cur      - Display current mgmt network definitions
     clear    - Clear current mgmt network definitions
```

The following table describes the Management Networks Configuration menu options. You can configure up to 10 management networks on the switch.

Table 96 Management Networks Configuration menu options

Command	Description
`add <IP address> <IP mask>`	Adds a defined network through which switch access is allowed through Telnet, SNMP, or the browser-based interface. A range of IP addresses is produced when used with a network mask address. Specify an IP address and mask address in dotted-decimal notation.
`rem <IP address> <IP mask>`	Removes a defined network, which consists of a management network address and a management network mask address.
`cur`	Displays the current management networks parameters.
`clear`	Clears the management network definitions.

User Access Control configuration

Command: `/cfg/sys/access/user`

```
[User Access Control Menu]
     uid      - User ID Menu
     eject    - Eject user
     usrpw    - Set user password (user)
     opw      - Set operator password (oper)
     admpw    - Set administrator password (admin)
     cur      - Display current user status
```

The following table describes the User Access Control menu options.

Table 97 User Access Control Configuration menu options

Command	Description
`uid <1-10>`	Displays the User ID Menu for the selected user.
`eject <user-name>`	Ejects the selected user from the switch.
`usrpw <1-128 characters>`	Sets the user (`user`) password (maximum 128 characters). The user has no direct responsibility for switch management. He or she can view switch status information and statistics, but cannot make any configuration changes.
`opw <1-128 characters>`	Sets the operator (`oper`) password (maximum 128 characters). The operator manages all functions of the switch. He or she can view all switch information and statistics and can reset ports or the entire switch.
`admpw <1-128 characters>`	Sets the administrator (`admin`) password (maximum 128 characters). The super user administrator has complete access to all menus, information, and configuration commands on the switch, including the ability to change both the user and administrator passwords.
`cur`	Displays the current user status.

User ID configuration

Command: `/cfg/sys/access/user/uid <uid number>`

```
[User ID 1  Menu]
     cos      - Set class of service
     name     - Set user name
     pswd     - Set user password
     ena      - Enable user ID
     dis      - Disable user ID
     del      - Delete user ID
     cur      - Display current user configuration
```

The following table describes the User ID Configuration menu options.

Table 98 User ID Configuration menu options

Command	Description
`cos <user|oper|admin>`	Sets the Class-of-Service to define the user's authority level.
`name <1-8 characters>`	Defines the user name.
`pswd <1-128 characters>`	Sets the user password of up to 128 characters maximum.
`ena`	Enables the user ID.
`dis`	Disables the user ID.
`del`	Deletes the user ID.
`cur`	Displays the current user ID parameters.

HTTPS Access configuration

Command: `/cfg/sys/access/https`

```
[https Menu]
     access   - Enable/Disable HTTPS Web access
     port     - HTTPS WebServer port number
     generate - Generate self-signed HTTPS server certificate
     certSave - save HTTPS certificate
     cur      - Display current SSL Web Access configuration
```

The following table describes the HTTPS Access Configuration menu options.

Table 99 HTTPS Access Configuration menu options

Command	Description
`access enable|disable`	Enables or disables BBI access (Web access) using HTTPS. The default value is `disabled`.
`port <TCP port number>`	Defines the HTTPS Web server port number. The default is 443.
`generate`	Allows you to generate a certificate to connect to the SSL to be used during the key exchange. A default certificate is created when HTTPS is enabled for the first time. The user can create a new certificate defining the information that they want to be used in the various fields. For example: • Country Name (2 letter code) [ ]: JP • State or Province Name (full name) [ ]: Tokyo • Locality Name (for example, city) [ ]: Fuchu • Organization Name (for example, company) [ ]: NEC • Organizational Unit Name (for example, section) [ ]: SIGMABLADE • Common Name (for example, user's name) [ ]: Taro • Email (for example, email address) [ ]: info@nec.com You must confirm if you want to generate the certificate. It takes approximately 30 seconds to generate the certificate. Then the switch restarts SSL agent.
`certSave`	Allows the client, or the Web browser, to accept the certificate and save the certificate to Flash to be used when the switch is rebooted.
`cur`	Displays the current SSL Web Access configuration.

Port configuration

Command: `/cfg/port <port number>`

```
[Port 1 Menu]
     gig      - Gig Phy Menu
     aclqos   - Acl/Qos Configuration Menu
     8021ppri - Set default 802.1p priority
     pvid     - Set default port VLAN id
     name     - Set port name
     rmon     - Enable/Disable RMON for port
     tag      - Enable/disable VLAN tagging for port
     tagpvid  - Enable/disable tagging on pvid
     brate    - Set BroadCast Threshold
     mrate    - Set MultiCast Threshold
     drate    - Set Dest. Lookup Fail Threshold
     ena      - Enable port
     dis      - Disable port
     cur      - Display current port configuration
```

This menu enables you to configure settings for individual switch ports. This command is enabled by default.

NOTE: Port 17 is a port for switch management interface.

The following table describes the Port Configuration Menu options.

Table 100 Port Configuration Menu options

Command	Description
`gig`	Displays theGigabit Ethernet Physical Link Menu.
`aclqos`	Displays the Access Control List (ACL)/Quality of Service (QoS) configuration menu.
`8021ppri <0-7>`	Configures the port's 802.1p priority level.
`pvid <1-4094>`	Sets the default VLAN number which will be used to forward frames which are not VLAN tagged. The default number for all ports except Port 17 is 1. **Note**: VLAN 4095 is a VLAN for switch management interface.
`name <1-64 characters>|none`	Sets a name for the port (maximum 64 characters). The assigned port name displays next to the port number on some information and statistics screens.
`rmon enable|disable`	Enables or disables Remote Monitoring for the port. The default is disabled. RMON must be enabled for any RMON configurations to function.
`tag enable|disable`	Disables or enables VLAN tagging for this port. The default is disabled.
`tagpvid enable|disable`	Disables or enables VLAN tag persistence. When disabled, the VLAN tag is removed from packets whose VLAN tag matches the port PVID. The default is enabled.
`brate <0-262143>|dis`	Limits the number of broadcast packets per second to the specified value. If disabled (`dis`), the port forwards all broadcast packets.
`mrate <0-262143>|dis`	Limits the number of multicast packets per second to the specified value. If disabled (dis), the port forwards all multicast packets.
`drate <0-262143>|dis`	Limits the number of unknown unicast packets per second to the specified value. If disabled (`dis`), the port forwards all unknown unicast packets.
`ena`	Enables the port.
`dis`	Disables the port. To temporarily disable a port without changing its configuration attributes, see the "Temporarily disabling a port" section later in this chapter.
`cur`	Displays current port parameters.

Temporarily disabling a port

To temporarily disable a port without changing its stored configuration attributes, enter the following command at any prompt:

```
Main# /oper/port <port number>/dis
```

Because this configuration sets a temporary state for the port, you do not need to use **apply** or **save.** The port state will revert to its original configuration when the switch is reset. See the "Menu information" section in the "Operations Menu" chapter for other operations-level commands.

Port link configuration

Command: `/cfg/port <port number>/gig`

```
[Gigabit Link Menu]
      speed   - Set link speed
      mode    - Set full or half duplex mode
      fctl    - Set flow control
      auto    - Set auto negotiation
      cur     - Display current gig link configuration
```

Use these menu options to set port parameters for the port link.

Link menu options are described in the following table and display on the Gigabit port configuration menus for the switch. Using these configuration menus, you can set port parameters such as speed, duplex, flow control, and negotiation mode for the port link.

The following table describes the Gigabit Link Configuration Menu options.

Table 101 Gigabit Link Configuration Menu options

Command	Description
`speed 10|100|any`	Sets the link speed. Not all options are valid on all ports. The choices include: • 10: 10 Mb/s • 100: 100 Mb/s • "any," for automatic detection (default) **Note**: Ports 1-16 Ports and 18 – 21 are set to 10000 Mb/s, and cannot be changed.
`mode full|half|any`	Sets the operating mode. Not all options are valid on all ports. The choices include: • Full-duplex • Half-duplex • "Any," for automatic detection (default) **Note**: Ports 1-16 and Ports 18 – 21 are set to full duplex. These ports cannot be changed.
`fctl rx|tx|both|none`	Sets the flow control. The choices include: • Receive (rx) flow control • Transmit (tx) flow control • Both receive and transmit flow control (default) • No flow control Note: Management port 17 is fixed at both, and cannot be changed.
`auto on|off`	Enables or disables auto-negotiation for the port. **Note**: Ports 1-16 Ports and 18 – 21 cannot be set to auto- negotiate..
`cur`	Displays current port parameters.

Port ACL/QoS configuration

Command: `/cfg/port <port number>/aclqos`

```
[Port 20 ACL Menu]
     add      - Add ACL or ACL group to this port
     rem      - Remove ACL or ACL group from this port
     cur      - Display current ACLs for this port
```

The following table describes the port ACL/QoS Configuration Menu options.

Table 102 Port ACL/QoS Configuration Menu options

Command	Description
`add acl <1-384>| grp <1-384>`	Assigns an ACL or ACL Group to the port.
`rem acl <1-384>| grp <1-384>`	Removes an ACL or ACL Group from the port.
`cur`	Displays current port ACL/QoS parameters.

Layer 2 configuration

Command: `/cfg/l2`

```
[Layer 2 Menu]
     8021x    - 802.1x Menu
     mrst     - Multiple Spanning Tree/Rapid Spanning Tree Menu
     stp      - Spanning Tree Menu
     fdb      - FDB
     trunk    - Trunk Group Menu
     thash    - IP Trunk Hash Menu
     lacp     - Link Aggregation Control Protocol Menu
     vlan     - VLAN Menu
     upfast   - Enable/disable Uplink Fast
     update   - UplinkFast station update rate
     cur      - Display current layer 2 parameters
```

The following table describes the Layer 2 Configuration Menu options.

Table 103 L2 Configuration Menu options

Command	Description
`8021x`	Displays the 802.1x Configuration Menu.
`mrst`	Displays the Rapid Spanning Tree/Multiple Spanning Tree Protocol Configuration Menu.
`stp <1-128>`	Displays the Spanning Tree Configuration Menu.
`fdb`	Displays the Forwarding Database Configuration Menu.
`trunk <1-12>`	Displays the Trunk Group Configuration Menu for the selected trunk (1-12).
`thash`	Displays the IP Trunk Hash Menu.
`lacp`	Displays the Link Aggregation Control Protocol Menu.
`vlan <1-4094>`	Displays the VLAN Configuration Menu.
`upfast enable|disable`	Enables or disables Fast Uplink Convergence, which provides rapid Spanning Tree convergence to an upstream switch during failover. The default is disabled. **Note**: When enabled, this feature increases bridge priorities to 65500 for all STGs except STG 128 and path cost by 3000 for all external STP ports.
`update <10-200>`	Configures the station update rate, in packets per second. The range is 10-200. The default value is 40.
`cur`	Displays current Layer 2 parameters.

802.1x configuration

Command: `/cfg/l2/8021x`

```
[802.1x Configuration Menu]
     global   - Global 802.1x configuration menu
     port     - Port 802.1x configuration menu
     ena      - Enable 802.1x access control
     dis      - Disable 802.1x access control
     cur      - Show 802.1x configuration
```

The following table describes the 802.1x Configuration Menu options.

Table 104 802.1x Configuration Menu options

Command	Description
`global`	Displays the global 802.1x Configuration Menu.
`port <port number>`	Displays the 802.1x Port Menu.
`ena`	Globally enables 802.1x.
`dis`	Globally disables 802.1x. This is the default.
`cur`	Displays current 802.1x parameters.

802.1x Global configuration

Command: `/cfg/l2/8021x/global`

```
[802.1x Global Configuration Menu]
     mode     - Set access control mode
     qtperiod - Set EAP-Request/Identity quiet time interval
     txperiod - Set EAP-Request/Identity retransmission timeout
     suptmout - Set EAP-Request retransmission timeout
     svrtmout - Set server authentication request timeout
     maxreq   - Set max number of EAP-Request retransmissions
     raperiod - Set reauthentication time interval
     reauth   - Set reauthentication status to on or off
     default  - Restore default 802.1x configuration
     cur      - Display current 802.1x configuration
```

The global 802.1x menu allows you to configure parameters that affect all ports in the switch.

The following table describes the 802.1x Global Configuration Menu options.

Table 105 802.1x Global Configuration Menu options

Command	Description
`mode force-unauth|auto|force-auth`	Sets the type of access control for all ports: • **`force-unauth`** - the port is unauthorized unconditionally. • **`auto`** - the port is unauthorized until it is successfully authorized by the RADIUS server. • **`force-auth`** - the port is authorized unconditionally, allowing all traffic. The default value is `force-auth`.
`qtperiod <0-65535>`	Sets the time, in seconds, the authenticator waits before transmitting an EAP-Request/ Identity frame to the supplicant (client) after an authentication failure in the previous round of authentication. The default value is 60 seconds.
`txperiod <1-65535>`	Sets the time, in seconds, the authenticator waits for an EAP-Response/Identity frame from the supplicant (client) before retransmitting an EAP-Request/Identity frame. The default value is 30 seconds.

Table 105 802.1x Global Configuration Menu options

Command	Description
`suptmout <1-65535>`	Sets the time, in seconds, the authenticator waits for an EAP-Response packet from the supplicant (client) before retransmitting the EAP-Request packet to the authentication server. The default value is 30 seconds.
`svrtmout <1-65535>`	Sets the time, in seconds, the authenticator waits for a response from the Radius server before declaring an authentication timeout. The default value is 30 seconds. The time interval between transmissions of the RADIUS Access-Request packet containing the supplicant's (client's) EAP-Response packet is determined by the current setting of `/cfg/sys/radius/timeout` (default is 3 seconds).
`maxreq <1-10>`	Sets the maximum number of times the authenticator retransmits an EAP-Request packet to the supplicant (client). The default value is 2.
`raperiod <1-604800>`	Sets the time, in seconds, the authenticator waits before re-authenticating a supplicant (client) when periodic re-authentication is enabled. The default value is 3600 seconds.
`reauth on|off`	Sets the re-authentication status to `on` or `off`. The default value is `off`.
`default`	Resets the global 802.1x parameters to their default values.
`cur`	Displays current global 802.1x parameters.

802.1x Port configuration

Command: `/cfg/l2/8021x/port <port number>`

```
[802.1x Port Configuration Menu]
     mode     - Set access control mode
     qtperiod - Set EAP-Request/Identity quiet time interval
     txperiod - Set EAP-Request/Identity retransmission timeout
     suptmout - Set EAP-Request retransmission timeout
     svrtmout - Set server authentication request timeout
     maxreq   - Set max number of EAP-Request retransmissions
     raperiod - Set reauthentication time interval
     reauth   - Set reauthentication status to on or off
     default  - Restore default 802.1x configuration
     global   - Apply current global 802.1x configuration to this port
     cur      - Display current 802.1x configuration
```

The 802.1x port menu allows you to configure parameters that affect the selected port in the switch. These settings override the global 802.1x parameters.

The following table describes the 802.1x Port Configuration Menu options.

Table 106 802.1x Port Configuration Menu options

Command	Description
`mode force-unauth|auto|force-auth`	Sets the type of access control for the port: • **`force-unauth`** - the port is unauthorized unconditionally. • **`auto`** - the port is unauthorized until it is successfully authorized by the RADIUS server. • **`force-auth`** - the port is authorized unconditionally, allowing all traffic. The default value is `force-auth`.
`qtperiod <0-65535>`	Sets the time, in seconds, the authenticator waits before transmitting an EAP-Request/ Identity frame to the supplicant (client) after an authentication failure in the previous round of authentication. The default value is 60 seconds.
`txperiod <1-65535>`	Sets the time, in seconds, the authenticator waits for an EAP-Response/Identity frame from the supplicant (client) before retransmitting an EAP-Request/Identity frame. The default value is 30 seconds.
`suptmout <1-65535>`	Sets the time, in seconds, the authenticator waits for an EAP-Response packet from the supplicant (client) before retransmitting the EAP-Request packet to the authentication server. The default value is 30 seconds.
`svrtmout <1-65535>`	Sets the time, in seconds, the authenticator waits for a response from the RADIUS server before declaring an authentication timeout. The default value is 30 seconds. The time interval between transmissions of the RADIUS Access-Request packet containing the supplicant's (client's) EAP-Response packet is determined by the current setting of `/cfg/sys/radius/timeout` (default is 3 seconds).
`maxreq <1-10>`	Sets the maximum number of times the authenticator retransmits an EAP-Request packet to the supplicant (client). The default value is 2.
`raperiod <1-604800>`	Sets the time, in seconds, the authenticator waits before re-authenticating a supplicant (client) when periodic re-authentication is enabled. The default value is 3600 seconds.
`reauth on|off`	Sets the re-authentication status to `on` or `off`. The default value is `off`.
`default`	Resets the port 802.1x parameters to their default values.
`global`	Applies the global 802.1x parameters to this port.
`cur`	Displays current port 802.1x parameters.

Rapid Spanning Tree Protocol / Multiple Spanning Tree Protocol configuration

Command: `/cfg/l2/mrst`

```
[Multiple Spanning Tree Menu]
      cist    - Common and Internal Spanning Tree menu
      name    - Set MST region name
      rev     - Set revision level of this MST region
      maxhop  - Set Maximum Hop Count for MST (4 - 60)
      mode    - Spanning Tree Mode
      on      - Globally turn Multiple Spanning Tree (MSTP/RSTP) ON
      off     - Globally turn Multiple Spanning Tree (MSTP/RSTP) OFF
      cur     - Display current MST parameters
```

The switch supports the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) and IEEE 802.1s Multiple Spanning Tree Protocol (MSTP). MSTP allows you to map many VLANs to a small number of spanning tree groups, each with its own topology.

You can configure up to 32 spanning tree groups on the switch. MRST is turned off by default.

NOTE: When Multiple Spanning Tree is turned on, VLAN 1 is moved from Spanning Tree Group 1 to the Common Internal Spanning Tree (CIST). When Multiple Spanning Tree is turned off, VLAN 1 is moved back to Spanning Tree Group 1.

The following table describes the Multiple Spanning Tree Configuration Menu options.

Table 107 Multiple Spanning Tree Configuration Menu options

Command	Description
`cist`	Displays the Common Internal Spanning Tree (CIST) Menu.
`name <1-32 characters>`	Configures a name for the MSTP region. All devices within a MSTP region must have the same region name.
`rev <0-65535>`	Configures the revision level for the MSTP region. The revision level is used as a numerical identifier for the region. All devices within a MSTP region must have the same revision level number. The range is 0-65535.
`maxhop <4-60>`	Configures the maximum number of bridge hops a packet may to traverse before it is dropped. The range is from 4 to 60 hops. The default is 20.
`mode rstp|mstp`	Selects either Rapid Spanning Tree mode (`RSTP`) or Multiple Spanning Tree mode (`MSTP`). The default mode is RSTP.
`on`	Globally turn RSTP/MSTP ON. Note: When RSTP is turned on, the configuration parameters for STP group 1 apply to RSTP
`off`	Globally turn RSTP/MSTP OFF. This is the default.
`cur`	Displays the current RSTP/MSTP configuration.

NOTE:

- IEEE 802.1w standard-based RSTP implementation runs on one STG (i.e. same as one spanning tree instance) only. As a result, if 'rstp' mode is selected under the `/cfg/mrst/mode` command, then only a single RSTP instance (default for STG 1) is supported for all VLANs, including the Default VLAN 1.
- If multiple spanning tree instances are required, then select 'mstp' mode so that multiple VLANs are handled by multiple spanning tree instances, as specified by IEEE 802.1s standard-based MSTP implementation.
- IEEE 802.1s MSTP supports rapid convergence using IEEE 802.1w RSTP.
- PVST+ does not support rapid convergence in current versions.

NOTE:
The following configurations are unsupported:

- PVST+ (default Spanning Tree setting) is NOT interoperable with Cisco Rapid PVST+.
- MSTP/RSTP (with mode set to either 'mstp' or 'rstp') is NOT interoperable with Cisco Rapid PVST+.

The following configurations are supported:

- PVST+ (default Spanning Tree setting) is interoperable with Cisco PVST+.
- MSTP/RSTP (with mode set to 'mstp') is interoperable with Cisco MST/RSTP.

Common Internal Spanning Tree configuration

Command: `/cfg/l2/mrst/cist`

```
[Common Internal Spanning Tree Menu]
    brg     - CIST Bridge parameter menu
    port    - CIST Port parameter menu
    add     - Add VLAN(s) to CIST
    default - Default Common Internal Spanning Tree and Member parameters
    cur     - Display current CIST parameters
```

The Common Internal Spanning Tree (CIST) provides compatibility with different MSTP regions and with devices running different Spanning Tree instances. It is equivalent to Spanning Tree Group 0.

The following table describes the commands used to configure Common Internal Spanning Tree Configuration Menu options.

Table 108 Common Internal Spanning Tree Configuration Menu options

Command	Description
`brg`	Displays the CIST Bridge Menu.
`port <port number>`	Displays the CIST Port Menu.
`add <1-4095>`	Adds VLANs to the CIST. Enter one VLAN per line, and press **Enter** to add the VLANs.
`default`	Resets all CIST parameters to their default values.
`cur`	Displays the current CIST configuration.

CIST bridge configuration

Command: `/cfg/l2/mrst/cist/brg`

```
[CIST Bridge Menu]
      prior   - Set CIST bridge Priority (0-65535)
      mxage   - Set CIST bridge Max Age (6-40 secs)
      fwd     - Set CIST bridge Forward Delay (4-30 secs)
      cur     - Display current CIST bridge parameters
```

CIST bridge parameters are used only when the switch is in MSTP mode. CIST parameters do not affect operation of STP/PVST+.

The following table describes the commands used to configure CIST Bridge Configuration Menu options parameters.

Table 109 CIST Bridge Configuration Menu options

Command	Description
`prior <0-65535>`	Configures the CIST bridge priority. The bridge priority parameter controls which bridge on the network is the MSTP root bridge. To make this switch the root bridge, configure the bridge priority lower than all other switches and bridges on your network. The lower the value, the higher the bridge priority. The range is 0 to 65535, and the default is 32768. This command does not apply to RSTP. See the "Bridge Spanning Tree configuration" section for more information.
`mxage <6-40>`	Configures the CIST bridge maximum age. The maximum age parameter specifies the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the MSTP network. The range is 6 to 40 seconds, and the default is 20 seconds. This command does not apply to RSTP. See the "Bridge Spanning Tree configuration" section for more information.

Table 109 CIST Bridge Configuration Menu options

Command	Description
`fwd <4-30>`	Configures the CIST bridge forward delay parameter. The forward delay parameter specifies the amount of time that a bridge port has to wait before it changes from the listening state to the learning state and from the learning state to the forwarding state. The range is 4 to 30 seconds, and the default is 15 seconds. This command does not apply to RSTP. See the "Bridge Spanning Tree configuration" section for more information.
`cur`	Displays the current CIST bridge configuration.

CIST port configuration

Command: `/cfg/l2/mrst/cist/port <port number>`

```
[CIST Port 1 Menu]
   prior   - Set port Priority (0-240)
   cost    - Set port Path Cost (1-200000000, 0 for auto)
   hello   - Set CIST port Hello Time (1-10 secs)
   link    - Set MSTP link type (auto, p2p, or shared; default: auto)
   edge    - Enables or disables edge port
   on      - Turn port's Spanning Tree ON
   off     - Turn port's Spanning Tree OFF
   cur     - Display current port Spanning Tree parameters
```

CIST port parameters are used to modify MST operation on an individual port basis. CIST parameters do not affect operation of STP/PVST+.

Port parameters include:

- Port priority
- Port path cost
- Port Hello time
- Link type
- Edge
- On and off
- Current port configuration

The following table describes the commands used to configure CIST Port Configuration Menu options.

Table 110 CIST Port Configuration Menu options

Command	Description
`prior <0-240>`	Configures the CIST port priority. The port priority helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. The range is 0 to 240, in steps of 16 (0, 16, 32...), and the default is 128.
`cost <1-200000000>`	Configures the CIST port path cost. The port path cost is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. The default is 2000 for10 Gb ports.
`hello <1-10>`	Configures the CIST port Hello time. The Hello time specifies how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge Hello value. The range is 1 to 10 seconds, and the default is 2 seconds.
`link auto|p2p|shared`	Defines the type of link connected to the port, as follows: • **auto**: Configures the port to detect the link type, and automatically match its settings. • **p2p**: Configures the port for Point-To-Point protocol. • **shared**: Configures the port to connect to a shared medium (usually a hub). The default link type is **auto**.
`edge disable|enable`	Enables or disables this port as an edge port. An edge port is not connected to a bridge, and can begin forwarding traffic as soon as the link is up. Configure server ports as edge ports (enabled). By default, Ports 1-16 are configured as edge ports.
`On`	Enables CIST on the port. This is the default for Ports 18 - 21.
`Off`	Disables CIST on the port.
`Cur`	Displays the current CIST port configuration.

Spanning Tree configuration

Command: `/cfg/l2/stp <STG number>`

```
[Spanning Tree Group 1 Menu]
      brg     - Bridge parameter menu
      port    - Port parameter menu
      add     - Add VLAN(s) to Spanning Tree Group
      remove  - Remove VLAN(s) from Spanning Tree Group
      clear   - Remove all VLANs from Spanning Tree Group
      on      - Globally turn Spanning Tree ON
      off     - Globally turn Spanning Tree OFF
      default - Default Spanning Tree and Member parameters
      cur     - Display current bridge parameters
```

This switch supports the IEEE 802.1D Spanning Tree Protocol (STP) and Cisco PVST+ protocols. You can configure up to 127 spanning tree groups on the switch (STG 128 is reserved for switch management). Spanning Tree is turned on by default.

NOTE: When RSTP is turned on, only STP group 1 can be configured.

The following table describes the Spanning Tree Configuration Menu options.

Table 111 Spanning Tree Configuration Menu options

Command	Description
`brg`	Displays the Bridge Spanning Tree Menu.
`port <port number>`	Displays the Spanning Tree Port Menu.
`add <1-4094>`	Associates a VLAN with a spanning tree and requires an external VLAN ID as a parameter.
`remove <1-4094>`	Breaks the association between a VLAN and a spanning tree and requires an external VLAN ID as a parameter.
`clear`	Removes all VLANs from a spanning tree.
`on`	Globally enables Spanning Tree Protocol.
`off`	Globally disables Spanning Tree Protocol.
`default`	Restores a spanning tree instance to its default configuration.
`cur`	Displays current Spanning Tree Protocol parameters.

Bridge Spanning Tree configuration

Command: `/cfg/l2/stp <STG number>/brg`

```
[Bridge Spanning Tree Menu]
      prior   - Set bridge Priority [0-65535]
      hello   - Set bridge Hello Time [1-10 secs]
      mxage   - Set bridge Max Age (6-40 secs)
      fwd     - Set bridge Forward Delay (4-30 secs)
      cur     - Display current bridge parameters
```

Spanning tree bridge parameters can be configured for each Spanning Tree Group. STP bridge parameters include:

- Bridge priority
- Bridge hello time
- Bridge maximum age
- Forwarding delay
- Current bridge configuration

The following table describes the Bridge Spanning Tree Configuration Menu options.

Table 112 Bridge Spanning Tree Configuration Menu options

Command	Description
`prior <0-65535>`	Configures the bridge priority. The bridge priority parameter controls which bridge on the network is the STP root bridge. To make this switch the root bridge, configure the bridge priority lower than all other switches and bridges on your network. The lower the value, the higher the bridge priority. The range is 0 to 65535, and the default is 32768. RSTP/MSTP: The range is 0 to 61440, in steps of 4096 (0, 4096, 8192...), and the default is 32768.
`hello <1-10>`	Configures the bridge hello time. The hello time specifies how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value. The range is 1 to 10 seconds, and the default is 2 seconds.
`mxage <6-40>`	Configures the bridge maximum age. The maximum age parameter specifies the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network. The range is 6 to 40 seconds, and the default is 20 seconds.
`fwd <4-30>`	Configures the bridge forward delay parameter. The forward delay parameter specifies the amount of time that a bridge port has to wait before it changes from the listening state to the learning state and from the learning state to the forwarding state. The range is 4 to 30 seconds, and the default is 15 seconds.
`cur`	Displays the current bridge STP parameters.

When configuring STP bridge parameters, the following formulas must be used:

- 2*(*fwd*-1) ≥ *mxage*
- 2*(*hello*+1) ≤ *mxage*

Spanning Tree port configuration

Command: `/cfg/l2/stp <STG number>/port <port number>`

```
[Spanning Tree Port 1 Menu]
      prior   - Set port Priority (0-255)
      cost    - Set port Path Cost (1-65535 (802.1d) /
                1-200000000 (MSTP/RSTP)/0 for auto)
      link    - Set port link type (auto, p2p, or shared; default: auto)
      edge    - Enable/disable edge port
      fastfwd - Enable/disable Port Fast Forwarding mode
      on      - Turn port's Spanning Tree ON
      off     - Turn port's Spanning Tree OFF
      cur     - Display current port Spanning Tree parameters
```

By default for STP/PVST+, Spanning tree is turned Off for downlink ports (1-16), and turned On for uplink ports (18-21). By default for RSTP/MSTP, Spanning tree is turned Off for all downlink ports (1-16) configured as Edge ports, and turned On for uplink ports (18-21).

Spanning tree port parameters are used to modify STP operation on an individual port basis. STP port parameters include:

- Port priority
- Port path cost

The following table describes the Spanning Tree Port Configuration Menu options.

Table 113 Spanning Tree Port Configuration Menu options

Command	Description
`prior <0-255>`	Configures the port priority. The port priority helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. The range is 0 to 255, and the default is 128. RSTP/MSTP: The range is 0 to 240, in steps of 16 (0, 16, 32...) and the default is 128.
`cost <0-200000000>`	Configures the port path cost. The port path cost is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. The range is 0 to 65535. The default is 2 for 10Gb ports except Port 17. A value of 0 indicates that the default cost will be computed for an auto-negotiated link speed. RSTP/MSTP: The range is 0 – 200000000, and the default is 2000 for 10Gb ports except Port 17.
`link auto|p2p|shared`	Defines the type of link connected to the port, as follows: • auto: Configures the port to detect the link type, and automatically match its settings. • p2p: Configures the port for Point-To-Point protocol. • shared: Configures the port to connect to a shared medium (usually a hub). This command only applies when RSTP is turned on.
`edge disable|enable`	Enables or disables this port as an edge port. An edge port is not connected to a bridge, and can begin forwarding traffic as soon as the link is up. Configure server ports as edge ports (enabled). By default, Ports 1-16 are configured as edge ports. This command only applies when RSTP is turned on. See the "Common Internal Spanning Tree configuration" section for more information.
`fastfwd disable|enable`	Enables or disables Port Fast Forward on the port. The default is disabled.
`on`	Enables STP on the port. This is the default for Ports 18 - 21.
`off`	Disables STP on the port.
`cur`	Displays the current STP port parameters.

Forwarding Database configuration

Command: `/cfg/l2/fdb`

```
[FDB Menu]
     static   - Static FDB Menu
     aging    - Configure FDB aging value
     cur      - Display current FDB configuration
```

The following table describes the Forwarding Database Configuration Menu options.

Table 114 FDB Configuration Menu options

Command	Description
`static`	Displays the Static FDB Configuration Menu.
`aging <0-65535>`	Configures the aging value for FDB entries. The default value is 300.
`cur`	Displays current FDB parameters.

Static FDB configuration

Command: `/cfg/l2/fdb/static`

```
[Static FDB Menu]
     add      - Add a permanent FDB entry
     del      - Delete a static FDB entry
     clear    - Clear static FDB entries
     cur      - Display current static FDB configuration
```

The following table describes the Static FDB Configuration Menu options.

Table 115 Static FDB Configuration Menu options

Command	Description
`add <MAC address> <VLAN> <port>`	Adds a static entry to the forwarding database.
`del <MAC address> <VLAN>`	Deletes a static entry from the forwarding database.
`clear mac <MAC Address>|VLAN <1-4095>| Port <port number>|All`	Clears specified static FDB entries from the forwarding database, as follows: • MAC address • VLAN • Port • All
`cur`	Displays current static FDB parameters.

Trunk configuration

Command: `/cfg/l2/trunk <1-12>`

```
[Trunk group 1 Menu]
      add     - Add port to trunk group
      rem     - Remove port from trunk group
      ena     - Enable trunk group
      dis     - Disable trunk group
      del     - Delete trunk group
      cur     - Display current Trunk Group configuration
```

Trunk groups can provide super-bandwidth connections between switches or other trunk capable devices. A trunk is a group of ports that act together, combining their bandwidth to create a single, larger port. Up to 12 trunk groups can be configured on the switch, with the following restrictions.

- Any physical switch port can belong to no more than one trunk group.
- Up to six ports/trunks can belong to the same trunk group.
- All ports in a trunk must have the same configuration for speed, flow control, and auto negotiation.
- Trunking from other devices must comply with Cisco® EtherChannel® technology.

NOTE: See the *N8406-026 10Gb Intelligent L3 Switch Application Guide* for information on how to use port trunks.

The following table describes the Trunk Group Configuration Menu options.

Table 116 Trunk Group Configuration Menu options

Command	Description
`add <port number>`	Adds a physical port to the current trunk group.
`rem <port number>`	Removes a physical port from the current trunk group.
`ena`	Enables the current trunk group.
`dis`	Turns the current trunk group off.
`del`	Removes the current trunk group configuration.
`cur`	Displays current trunk group parameters.

IP Trunk Hash configuration

Command: `/cfg/l2/thash`

```
[IP Trunk Hash Menu]
     set      - IP Trunk Hash Settings Menu
     cur      - Display current IP trunk hash configuration
```

The following table describes the IP Trunk Hash Configuration Menu options.

Table 117 IP Trunk Hash Configuration Menu options

Command	Description
`set`	Displays the Trunk Hash Settings menu.

Table 117 IP Trunk Hash Configuration Menu options

Command	Description
cur	Display current trunk hash configuration.

Layer 2 IP Trunk Hash configuration

Command: /cfg/l2/thash/set

```
[set IP Trunk Hash Settings Menu]
     smac     - Enable/disable smac hash
     dmac     - Enable/disable dmac hash
     sip      - Enable/disable sip hash
     dip      - Enable/disable dip hash
     cur      - Display current trunk hash setting
```

Trunk hash parameters are set globally for the switch. You can enable one or two parameters, to configure any of the following valid combinations:

- SMAC (source MAC only)
- DMAC (destination MAC only)
- SIP (source IP only)
- DIP (destination IP only)
- SIP + DIP (source IP and destination IP)
- SMAC + DMAC (source MAC and destination MAC)

The following table describes the IP Trunk Hash Configuration Menu options.

Table 118 IP Trunk Hash Set Menu options

Command	Description
smac	Enable or disable trunk hashing on the source MAC.
dmac	Enable or disable trunk hashing on the destination MAC.
sip	Enable or disable trunk hashing on the source IP.
dip	Enable or disable trunk hashing on the destination IP.
cur	Display current trunk hash configuration.

Link Aggregation Control Protocol configuration

Command: /cfg/l2/lacp

```
[LACP Menu]
     sysprio  - Set LACP system priority
     timeout  - Set LACP system timeout scale for timing out partner info
     port     - LACP port Menu
     cur      - Display current LACP configuration
```

The following table describes the LACP Configuration Menu options.

Table 119 LACP Configuration Menu options

Command	Description
sysprio *<1-65535>*	Defines the priority value (1 through 65535) for the switch. Lower numbers provide higher priority. The default value is 32768.
timeout short|long	Defines the timeout period before invalidating LACP data from a remote partner. Choose **short** (3 seconds) or **long** (90 seconds). The default value is **long**. **Note**: We recommends that you use a timeout value of **long**, to reduce LACPDU processing. If your switch's CPU utilization rate remains at 100% for periods of 90 seconds or more, consider using static trunks instead of LACP.

Table 119 LACP Configuration Menu options

Command	Description
`port <port number>`	Displays the LACP Port menu.
`cur`	Display current LACP configuration.

LACP Port configuration

Command: `/cfg/l2/lacp/port <port number>`

```
[LACP Port 2 Menu]
     mode     - Set LACP mode
     prio     - Set LACP port priority
     adminkey - Set LACP port admin key
     cur      - Display current LACP port configuration
```

The following table describes the LACP Port Configuration Menu options.

Table 120 LACP Port Configuration Menu options

Command	Description
`mode off|active|passive`	Set the LACP mode for this port, as follows: • **off** Turn LACP off for this port. You can use this port to manually configure a static trunk. The default value is **`off`**. • **active** Turn LACP on and set this port to active. Active ports initiate LACPDUs. • **passive** Turn LACP on and set this port to passive. Passive ports do not initiate LACPDUs, but respond to LACPDUs from active ports.
`prio <1-65535>`	Sets the priority value for the selected port. Lower numbers provide higher priority. Default is 32768.
`adminkey <1-65535>`	Set the admin key for this port. Only ports with the same admin key and oper key (operational state generated internally) can form a LACP trunk group.
`cur`	Displays the current LACP configuration for this port.

VLAN configuration

Command: `/cfg/l2/vlan <1-4094>`

```
[VLAN 1 Menu]
      name    - Set VLAN name
      stg     - Assign VLAN to a Spanning Tree Group
      add     - Add port to VLAN
      rem     - Remove port from VLAN
      def     - Define VLAN as list of ports
      ena     - Enable VLAN
      dis     - Disable VLAN
      del     - Delete VLAN
      cur     - Display current VLAN configuration
```

The commands in this menu configure VLAN attributes, change the status of the VLAN, delete the VLAN, and change the port membership of the VLAN.

By default, the VLAN menu option is disabled except VLAN 1 and 4095, which is always enabled. This switch supports a maximum of 1,000 VLANs. VLAN 4095 is reserved for switch management interface.

NOTE: See the *N8406-026 10Gb Intelligent L3 Switch Application Guide* for information on VLANs.

The following table describes the VLAN Configuration Menu options.

Table 121 VLAN Configuration Menu options

Command	Description
name *<1-32 characters>*	Assigns a name to the VLAN or changes the existing name. The default VLAN name is the first one.
stg *<0-127>*	Assigns a VLAN to a spanning tree group. STG number is assigned STGs 1-127 for STP/PVST+, only STG 1 for RSTP, and STGs 0-32 for MSTP (STG 0 is CIST).
add *<port number>*	Adds ports to the VLAN membership.
rem *<port number>*	Removes ports from the VLAN membership.
def *<list of port numbers>*	Defines which ports are members of this VLAN. Every port must be a member of at least one VLAN. By default, it defines ports to VLAN 1.
ena	Enables this VLAN.
dis	Disables this VLAN without removing it from the configuration.
del	Deletes this VLAN.
cur	Displays the current VLAN configuration.

IMPORTANT: All ports must belong to at least one VLAN. Any port which is removed from a VLAN and which is not a member of any other VLAN is automatically added to default VLAN #1. You cannot remove a port from VLAN #1 if the port has no membership in any other VLAN. Also, you cannot add a port to more than one VLAN unless the port has VLAN tagging turned on. See the **tag** command, in the "Port configuration" section earlier in this chapter.

Layer 3 configuration

Command: `/cfg/l3`

```
[Layer 3 Menu]
     if       - Interface Menu
     gw       - Default Gateway Menu
     route    - Static Route Menu
     arp      - ARP Menu
     frwd     - Forwarding Menu
     nwf      - Network Filters Menu
     rmap     - Route Map Menu
     rip      - Routing Information Protocol Menu
     ospf     - Open Shortest Path First (OSPF) Menu
     igmp     - IGMP Menu
     dns      - Domain Name System Menu
     bootp    - Bootstrap Protocol Relay Menu
     vrrp     - Virtual Router Redundancy Protocol Menu
     rtrid    - Set router ID
     cur      - Display current IP configuration
```

The following table describes the Layer 3 Configuration Menu options.

Table 122 L3 Configuration Menu options

Command	Description
if *<1-250>*	Displays the IP Interface Menu.
gw *<1-4, 254>*	Displays the IP Default Gateway Menu.
route	Displays the IP Static Route Menu.
arp	Displays the ARP (Address Resolution Protocol) Menu.
frwd	Displays the IP Forwarding Menu.
nwf *<1-256>*	Displays the Network Filter Configuration Menu.
rmap *<1-32>*	Displays the Route Map Menu.
rip	Displays the Routing Information Protocol Menu.
ospf	Displays the OSPF Menu.
igmp	Displays the IGMP Menu.
dns	Displays the IP Domain Name System Menu.
bootp	Displays the Bootstrap Protocol Menu.
vrrp	Displays the Virtual Router Redundancy Protocol Menu.

Table 122 L3 Configuration Menu options

Command	Description
rtrid <*IP address*>	Configures the Router ID.
cur	Displays the current IP configuration.

IP interface configuration

Command: /cfg/l3/if <*1-250*>

```
[IP Interface 1 Menu]
     addr     - Set IP address
     mask     - Set subnet mask
     vlan     - Set VLAN number
     relay    - Enable/disable BOOTP relay
     ena      - Enable IP interface
     dis      - Disable IP interface
     del      - Delete IP interface
     cur      - Display current interface configuration
```

The switch can be configured with up to 250 IP interfaces. Each IP interface represents the switch on an IP subnet on your network. The IP Interface option is disabled by default. Interface 256 is reserved for switch management.

The following table describes the IP Interface Configuration Menu options.

Table 123 IP Interface Configuration Menu options

Command	Description
addr <*IP address*>	Configures the IP address of the switch interface, using dotted decimal notation. For example, 192.2.14.101
mask <*IP subnet mask*>	Configures the IP subnet address mask for the interface using dotted decimal notation. For example, 255.255.255.0
vlan <*1-4094*>	Configures the VLAN number for this interface. Each interface can belong to one VLAN, though any VLAN can have multiple IP interfaces in it.
relay	Enables or disables BOOTP relay on this IP interface. The default is enabled.
ena	Enables this IP interface.
dis	Disables this IP interface.
del	Removes this IP interface.
cur	Displays the current interface settings.

NOTE: If you enter an IP address for interface 1, you are prompted to change the BOOTP setting. Interface 250 is reserved for switch management interface.

Default Gateway configuration

Command: /cfg/l3/gw <*1-4, 254*>

```
[Default gateway 1 Menu]
      addr    - Set IP address
      intr    - Set interval between ping attempts
      retry   - Set number of failed attempts to declare gateway DOWN
      arp     - Enable/disable ARP only health checks
      ena     - Enable default gateway
      dis     - Disable default gateway
      del     - Delete default gateway
      cur     - Display current default gateway configuration
```

The switch supports up to four gateways, plus the management gateway 254. By default,

no gateways are configured on the switch. Enter 1, 2, 3, 4, or 254 in the command as the <gateway number>, depending upon which gateway you want to configure.

The following table describes the Default IP Gateway Configuration Menu options.

Table 124 Default IP Gateway Configuration Menu options

Command	Description
addr <*IP address*>	Configures the IP address of the default IP gateway using dotted decimal notation. For example, 192.4.17.44
intr <*0-60*>	The switch pings the default gateway to verify that it is up. The **intr** option sets the time between health checks. The range is from 0 to 60 seconds. The default is 2 seconds.
retry <*1-120*>	Sets the number of failed health check attempts required before declaring this default gateway inoperative. The range is from 1 to 120 attempts. The default is 8 attempts.
arp disable|enable	Enables or disables Address Resolution Protocol (ARP) health checks. This command is disabled by default.
ena	Enables the gateway for use.
dis	Disables the gateway.
del	Deletes the gateway from the configuration.
cur	Displays the current gateway settings.

NOTE: Gateway 254 is reserved for switch management interface.

IP Static Route configuration

Command: `/cfg/l3/route`

```
[IP Static Route Menu]
     add      - Add static route
     rem      - Remove static route
     clear    - Clear static routes
     cur      - Display current static route configuration
```

The following table describes the IP Static Route Configuration Menu options.

Table 125 IP Static Route Configuration Menu options

Command	Description
add <*IP address*> <*IP subnet mask*> <*gateway*> <*interface*>	Adds a static route. You will be prompted to enter a destination IP address, destination subnet mask, and gateway address. Enter all addresses using dotted decimal notation.
rem <*IP address*> <*IP subnet mask*>	Removes a static route. The destination address of the route to remove must be specified using dotted decimal notation.
clear dest|gw|if|all	Clears a static route that is specified.
cur	Displays the current IP configuration.

Address Resolution Protocol configuration

Command: `/cfg/l3/arp`

```
[ARP Menu]
     static   - Static ARP Menu
     rearp    - Set re-ARP period in minutes
     cur      - Display current ARP configuration
```

Address Resolution Protocol (ARP) is the TCP/IP protocol that resides within the Internet layer. ARP resolves a physical address from an IP address. ARP queries machines on the local network for their physical addresses. ARP also maintains IP to physical address pairs in its cache memory. In any IP communication, the ARP cache is consulted to see if the IP address of the computer or the router is present in the ARP cache. Then the corresponding physical address is used to send a packet.

The following table describes the ARP Configuration Menu options.

Table 126 ARP Configuration Menu options

Command	Description
`static`	Displays the Static ARP Menu.
`rearp <2-120>`	Defines re-ARP period in minutes. You can set this duration between 2 and 120 minutes. The default value is 10 minutes.
`cur`	Displays the current ARP configurations.

Static ARP configuration

Command: `/cfg/l3/arp/static`

```
[Static ARP Menu]
     add      - Add a parmanent ARP entry
     del      - Delete an ARP entry
     clear    - Clear static ARP entries
     cur      - Display current static ARP configuration
```

The following table describes the Static ARP Menu optionons.

Table 127 Static ARP Configuration Menu options

Command	Description
`add <IP address> <MAC address> <VLAN number> <port number>`	Adds a single ARP entry to switch memory.
`del <IP address>`	Removes a single ARP entry from switch memory.
`clear`	Clears the entire ARP list from switch memory.
`cur`	Displays the current ARP configurations.

IP Forwarding configuration

Command: `/cfg/l3/frwd`

```
[IP Forwarding Menu]
     dirbr    - Enable/disable forwarding directed broadcasts
     on       - Globally turn IP Forwarding ON
     off      - Globally turn IP Forwarding OFF
     cur      - Display current IP Forwarding configuration
```

The following table describes the IP Forwarding Configuration Menu options.

Table 128 IP Forwarding Configuration Menu options

Command	Description
`dirbr disable|enable`	Enables or disables forwarding directed broadcasts. This command is disabled by default.
`on`	Enables IP forwarding (routing) on the switch.
`off`	Disables IP forwarding (routing) on the switch. Forwarding is turned off by default.
`cur`	Displays the current IP forwarding settings.

Network Filter configuration

Command: `/cfg/l3/nwf <1-256>`

```
[IP Network Filter  1 Menu]
     addr     - IP Address
     mask     - IP Subnet mask
     enable   - Enable Network Filter
     disable  - Disable Network Filter
     delete   - Delete Network Filter
     current  - Display current Network Filter configuration
```

The following table describes the Network Filter Configuration Menu options.

Table 129 Network Filter Configuration Menu options

Command	Description
`addr <IP address>`	Sets the starting IP address for this filter.
`mask <IP subnet mask>`	Sets the IP subnet mask that is used with `/cfg/l3/nwf/addr` to define the range of IP addresses that will be accepted by the peer when the filter is enabled.
`enable`	Enables the Network Filter configuration.
`disable`	Disables the Network Filter configuration.
`delete`	Deletes the Network Filter configuration.
`current`	Displays the current the Network Filter configuration.

Route Map configuration

Command: `/cfg/l3/rmap <1-32>`

```
[IP Route Map 1 Menu]
     alist    - Access List number
     metric   - Set metric of the matched route
     type     - Set OSPF metric-type of the matched route
     prec     - Set the precedence of this route map
     enable   - Enable route map
     disable  - Disable route map
     delete   - Delete route map
     current  - Display current route map configuration
```

Routing maps control and modify routing information. The *map number* (1-32) represents the routing map you wish to configure.

The following table describes the Route Map Configuration Menu options.

Table 130 Route Map Configuration Menu options

Command	Description
`alist <1-8>`	Displays the Access List menu.
`metric <0-16777214>|none`	Sets the metric of the matched route.
`type 1|2|none`	Assigns the type of OSPF metric. • Type 1—External routes are calculated using both internal and external metrics. • Type 2—External routes are calculated using only the external metrics. Type 2 routes have more cost than Type 1. • none—Removes the OSPF metric.
`prec <1-255>`	Sets the precedence of the route map. The smaller the value, the higher the precedence. Default value is 10.
`enable`	Enables the route map.
`disable`	Disables the route map.
`delete`	Deletes the route map.
`current`	Displays the current route configuration.

IP Access List configuration

Command: `/cfg/l3/rmap <1-32>/alist <1-8>`

```
[IP Access List 1 Menu]
     nwf      - Network Filter number
     metric   - Metric
     action   - Set Network Filter action
     enable   - Enable Access List
     disable  - Disable Access List
     delete   - Delete Access List
     current  - Display current Access List configuration
```

The *route map number (*1-32) and the *access list number* (1-8) represent the IP access list you wish to configure. The following table describes the IP Access List Configuration Menu options.

Table 131 IP Access List Configuration Menu options

Command	Description
`nwf <1-256>`	Sets the network filter number.
`metric <1-16777214>|none`	Sets the metric value in the AS-External (ASE) LSA.
`action permit|deny`	Permits or denies action for the access list.
`enable`	Enables the access list.
`disable`	Disables the access list.
`delete`	Deletes the access list.
`current`	Displays the current Access List configuration.

Routing Information Protocol configuration

Command: `/cfg/l3/rip`

```
[Routing Information Protocol Menu]
     if       - RIP Interface Menu
     update   - Set update period in seconds
     redist   - RIP Route Redistribute Menu
     on       - Globally turn RIP ON
     off      - Globally turn RIP OFF
     current  - Display current RIP configuration
```

The RIP Menu is used for configuring Routing Information Protocol parameters. This option is turned off by default.

The following table describes the RIP Configuration Menu options.

Table 132 RIP Configuration Menu options

Command	Description
`if <1-249>`	Displays the RIP Interface menu.
`update <1-120>`	Configures the time interval for sending for RIP table updates, in seconds. The default value is 30 seconds.
`redist fixed|static|ospf|eospf`	Displays the RIP Route Redistribute menu.
`on`	Globally turns RIP on.
`off`	Globally turns RIP off. This is the default.
`current`	Displays the current RIP configuration.

RIP Interface configuration

Command: `/cfg/l3/rip/if <1-249>`

```
[RIP Interface 1 Menu]
     version  - Set RIP version
     supply   - Enable/disable supplying route updates
     listen   - Enable/disable listening to route updates
     poison   - Enable/disable poisoned reverse
     split    - Enable/disable split horizon
     trigg    - Enable/disable triggered updates
     mcast    - Enable/disable multicast updates
     default  - Set default route action
     metric   - Set metric
     auth     - Set authentication type
     key      - Set authentication key
     enable   - Enable interface
     disable  - Disable interface
     current  - Display current RIP interface configuration
```

The RIP Menu is used for configuring Routing Information Protocol parameters. This option is turned off by default.

NOTE: Do not configure RIP version 1 parameters if your routing equipment uses RIP version 2.

The following table describes the RIP Interface Configuration Menu options.

Table 133 RIP Interface Configuration Menu options

Command	Description
`version 1|2|both`	Configures the RIP version used by this interface. The default value is version `2`.
`supply disable|enable`	When enabled, the switch supplies routes to other routers. This command is enabled by default.
`listen disable|enable`	When enabled, the switch learns routes from other routers. This command is enabled by default.
`poison disable|enable`	When enabled, the switch uses split horizon with poisoned reverse. When disabled, the switch uses only split horizon. The default value is `disabled`.
`split disable|enable`	Enables or disables split horizon. The default value is `enabled`.
`trigg disable|enable`	Enables or disables Triggered Updates. Triggered Updates are used to speed convergence. When enabled, Triggered Updates force a router to send update messages immediately, even if it is not yet time for the update message. The default value is `enabled`.
`mcast disable|enable`	Enables or disables multicast updates of the routing table (using address 224.0.0.9). The default value is `enabled`.
`default none|listen|supply|both`	When listen, the switch accepts RIP default routes from other routers, but gives them lower priority than configured default gateways. When supply, the switch sends RIP default routes to other routers. When both, the switch operates as both "listen" and "supply". When none, the switch rejects RIP default routes. The default value is `none`.
`metric <1-15>`	Configures the route metric, which indicates the relative distance to the destination. The default value is `1`.
`auth none|password`	Configures the authentication type. The default is `none`.
`key <key>|none`	Configures the authentication key password.
`enable`	Enables this RIP interface.
`disable`	Disables this RIP interface. This is the default.
`cur`	Displays the current RIP configuration.

RIP Route Redistribution configuration

Command: `/cfg/l3/rip/redist fixed|static|ospf|eospf`

```
[RIP Redistribute Fixed  Menu]
     add      - Add rmap into route redistribution list
     rem      - Remove rmap from route redistribution list
     export   - Export all routes of this protocol
     cur      - Display current route-maps added
```

The following table describes the RIP Route Redistribute Menu options.

Table 134 RIP Redistribute Configuration Menu options

Command	Description
`add <1-32>|all`	Adds selected routing maps to the RIP route redistribution list. To add all the 32 route maps, enter `all`. To add specific route maps, enter routing map numbers one per line, NULL at the end. This option adds a route map to the route redistribution list. The routes of the redistribution protocol matched by the route maps in the route redistribution list will be redistributed.
`remove <1-32>|all`	Removes the route map from the RIP route redistribution list. Removes routing maps from the list. To remove all 32 route maps, enter `all`. To remove specific route maps, enter routing map numbers one per line, NULL at end.
`export <metric 1-15>|none`	Exports the routes of this protocol in which the metric and metric type are specified. To remove a previous configuration and stop exporting the routes of the protocol, enter `none`.
`cur`	Displays the current RIP route redistribute configuration.

Open Shortest Path First configuration

Command: `/cfg/l3/ospf`

```
[Open Shortest Path First Menu]
     aindex   - OSPF Area (index) Menu
     range    - OSPF Summary Range Menu
     if       - OSPF Interface Menu
     virt     - OSPF Virtual Links Menu
     md5key   - OSPF MD5 Key Menu
     host     - OSPF Host Entry Menu
     redist   - OSPF Route Redistribute Menu
     lsdb     - Set the LSDB limit for external LSA
     default  - Export default route information
     on       - Globally turn OSPF ON
     off      - Globally turn OSPF OFF
     cur      - Display current OSPF configuration
```

The following table describes the Open Shortest Path First Menu options.

Table 135 OSPF Configuration Menu options

Command	Description
`aindex <0-2>`	Displays the area index menu. This area index does not represent the actual OSPF area number.
`range <1-16>`	Displays summary routes menu for up to 16 IP addresses.
`if <1-249>`	Displays the OSPF interface configuration menu.
`virt <1-3>`	Displays the Virtual Links menu used to configure OSPF for a Virtual Link.
`md5key <1-255>`	Displays MD5 key configuration menu.
`host <1-128>`	Displays the menu for configuring OSPF for the host routes. Up to 128 host routes can be configured. Host routes are used for advertising network device IP addresses to external networks to perform server load balancing within OSPF. It also makes Area Border Route (ABR) load sharing and ABR failover possible.
`redist <fixed|static|rip>`	Displays Route Distribution Menu.
`lsdb <0-2000>`	Sets the link state database limit. Enter 0 (zero) for no limit. The default value is 0.
`default <1-16777214> <1|2>|none`	Sets one default route among multiple choices in an area. Enter `none` for no default route.
`on`	Enables OSPF.
`off`	Disables OSPF. This is the default.
`cur`	Displays the current OSPF configuration settings.

OSPF Area Index configuration

Command: `/cfg/l3/ospf/aindex <0-2>`

```
[OSPF Area (index) 1  Menu]
     areaid   - Set area ID
     type     - Set area type
     metric   - Set stub area metric
     auth     - Set authentication type
     spf      - Set time interval between two SPF calculations
     enable   - Enable area
     disable  - Disable area
     delete   - Delete area
     cur      - Display current OSPF area configuration
```

The following table describes the Area Index Configuration Menu options.

Table 136 OSPF Area Index Configuration Menu options

Command	Description
`areaid <IP address>`	Defines the area ID of the OSPF area number.
`type transit|stub|nssa`	Defines the type of area. For example, when a virtual link has to be established with the backbone, the area type must be defined as transit. • **transit:** allows area summary information to be exchanged between routing devices. Any area that is not a stub area or NSSA is considered to be transit area. • **stub:** is an area where external routing information is not distributed. Typically, a stub area is connected to only one other area. • **nssa:** Not-So-Stubby Area (NSSA) is similar to stub area with additional capabilities. For example, routes originating from within the NSSA can be propagated to adjacent transit and backbone areas. External routes from outside the Autonomous System (AS) can be advertised within the NSSA but are not distributed into other areas. The default is transit.
`metric <1-65535>`	Configures a stub area to send a numeric metric value. All routes received via that stub area carry the configured metric to potentially influencing routing decisions. Metric value assigns the priority for choosing the switch for default route. Metric type determines the method for influencing routing decisions for external routes. The default value is 1.
`auth none|password|md5`	Defines the authentication method, as follows: • **none:** No authentication required. • **password:** Authenticates simple passwords so that only trusted routing devices can participate. • **MD5:** This parameter is used when MD5 cryptographic authentication is required. The default is none.
`spf <0-255>`	Sets time interval between two successive SPF (shortest path first) calculations of the shortest path tree using the Dijkstra's algorithm. The default value is 10.
`enable`	Enables the OSPF area.
`disable`	Disables the OSPF area. This is the default.
`delete`	Deletes the OSPF area.
`cur`	Displays the current OSPF configuration.

OSPF Summary Range configuration

Command: `/cfg/l3/ospf/range <1-16>`

```
[OSPF Summary Range 1  Menu]
     addr     - Set IP address
     mask     - Set IP mask
     aindex   - Set area index
     hide     - Enable/disable hide range
     enable   - Enable range
     disable  - Disable range
     delete   - Delete range
     cur      - Display current OSPF summary range configuration
```

The following table describes the OSPF Summary Range Configuration Menu options.

Table 137 OSPF Summary Range Configuration Menu options

Command	Description
`addr <IP Address>`	Configures the base IP address for the range.
`mask <IP address mask>`	Configures the IP address mask for the range.
`aindex <0-2>`	Configures the area index used by the switch. The default is 0.
`hide disable|enable`	Hides the OSPF summary range. The default is disabled.
`enable`	Enables the OSPF summary range.
`disable`	Disables the OSPF summary range. This is the default.
`delete`	Deletes the OSPF summary range.
`cur`	Displays the current OSPF summary range.

OSPF Interface configuration

Command: `/cfg/l3/ospf/if <1-249>`

```
[OSPF Interface 1  Menu]
     aindex   - Set area index
     prio     - Set interface router priority
     cost     - Set interface cost
     hello    - Set hello interval in seconds
     dead     - Set dead interval in seconds
     trans    - Set transit delay in seconds
     retra    - Set retransmit interval in seconds
     key      - Set authentication key
     mdkey    - Set MD5 key ID
     enable   - Enable interface
     disable  - Disable interface
     delete   - Delete interface
     cur      - Display current OSPF interface configuration
```

The following table describes the OSPF Interface Configuration Menu options.

Table 138 OSPF Interface Configuration Menu options

Command	Description
`aindex <0-2>`	Configures the OSPF area index. The default is 0.
`prio <0-255>`	Configures the assigned priority value to the OSPF interfaces. (A priority value of 255 is the highest and 1 is the lowest. A priority value of 0 specifies that the interface cannot be used as Designated Router (DR) or Backup Designated Router (BDR).) The default value is 1.
`cost <1-65535>`	Configures cost set for the selected path—preferred or backup. Usually the cost is inversely proportional to the bandwidth of the interface. Low cost indicates high bandwidth. The default value is 1.
`hello <1-65535>`	Configures the interval in seconds between the `hello` packets for the interfaces. The default value is 10 seconds.
`dead <1-65535>`	Configures the health parameters of a `hello` packet, which is set for an interval of seconds before declaring a silent router to be down. The default value is 40 seconds.
`trans <1-3600>`	Configures the transit delay in seconds. The default value is 1 second.

Table 138 OSPF Interface Configuration Menu options

Command	Description
retra <*1-3600*>	Configures the retransmit interval in seconds. The default value is 5 seconds.
key <*key string*>|none	Sets the authentication key to clear the password.
mdkey <*1-255*>|none	Assigns an MD5 key to the interface. The default is none.
enable	Enables the OSPF interface.
disable	Disables the OSPF interface. This is the default.
delete	Deletes the OSPF interface.
cur	Displays the current settings for OSPF interface.

OSPF Virtual Link configuration

Command: /cfg/l3/ospf/virt <*1-3*>

```
[OSPF Virtual Link 1  Menu]
     aindex   - Set area index
     hello    - Set hello interval in seconds
     dead     - Set dead interval in seconds
     trans    - Set transit delay in seconds
     retra    - Set retransmit interval in seconds
     nbr      - Set router ID of virtual neighbor
     key      - Set authentication key
     mdkey    - Set MD5 key ID
     enable   - Enable interface
     disable  - Disable interface
     delete   - Delete interface
     cur      - Display current OSPF interface configuration
```

The following table describes the OSPF Virtual Link Configuration Menu options.

Table 139 OSPF Virtual Link Configuration Menu options

Command	Description
aindex <*0-2*>	Configures the OSPF area index. The default is 0.
hello <*1-65535*>	Configures the authentication parameters of a hello packet, which is set to be in an interval of seconds. The default value is 10 seconds.
dead <*1-65535*>	Configures the health parameters of a hello packet, which is set to be in an interval of seconds. Default is 60 seconds.
trans <*1-3600*>	Configures the delay in transit in seconds. Default is 1 second.
retra <*1-3600*>	Configures the retransmit interval in seconds. Default is 5 seconds.
nbr <*IP address*>	Configures the router ID of the virtual neighbor.
key <*password*>	Configures the password (up to 8 characters) for each virtual link. Default is none.
mdkey <*1-255*>|none	Sets MD5 key ID for each virtual link. Default is none.
enable	Enables OSPF virtual link.
disable	Disables OSPF virtual link. This is the default.
delete	Deletes OSPF virtual link.
cur	Displays the current OSPF virtual link settings.

OSPF Host Entry configuration

Command: /cfg/l3/ospf/host <*1-128*>

```
[OSPF Host Entry 1 Menu]
     addr     - Set host entry IP address
     aindex   - Set area index
     cost     - Set cost of this host entry
     enable   - Enable host entry
     disable  - Disable host entry
     delete   - Delete host entry
     cur      - Display current OSPF host entry configuration
```

The following table describes the OSPF Host Entry Configuration Menu options.

Table 140 OSPF Host Entry Configuration Menu options

Command	Description
addr <*IP address*>	Configures the base IP address for the host entry. For example, 100.10.1.1
aindex <*0-2*>	Configures lays the area index of the host. The default is 0.
cost <*1-65535*>	Configures the cost value of the host. The default value is 1.
enable	Enables OSPF host entry.
disable	Disables OSPF host entry. This is the default.
delete	Deletes OSPF host entry.
cur	Displays the current OSPF host entries.

OSPF Route Redistribution configuration

Command: /cfg/l3/ospf/redist fixed|static|rip

```
[OSPF Redistribute Fixed  Menu]
     add      - Add rmap into route redistribution list
     rem      - Remove rmap from route redistribution list
     export   - Export all routes of this protocol
     cur      - Display current route-maps added
```

The following table describes the OSPF Route Redistribution Configuration Menu options.

Table 141 OSPF Route Redistribution Configuration Menu options

Command	Description
add <*1-32*> <*1-32*> ...|all	Adds selected routing maps to the rmap list. To add all the 32 route maps, enter all. To add specific route maps, enter routing map numbers one per line, NULL at the end. This option adds a route map to the route redistribution list. The routes of the redistribution protocol matched by the route maps in the route redistribution list will be redistributed.
rem <*1-32*> <*1-32*> ... |all	Removes the route map from the route redistribution list. Removes routing maps from the rmap list. To remove all 32 route maps, enter all. To remove specific route maps, enter routing map numbers one per line, NULL at end.
export <*1-16777214*> <1|2>|none	Exports the routes of this protocol as external OSPF AS-external LSAs in which the metric and metric type are specified. To remove a previous configuration and stop exporting the routes of the protocol, enter none.
cur	Displays the current route map settings.

OSPF MD5 Key configuration

Command: /cfg/l3/ospf/md5key <*key ID*>

```
[OSPF MD5 Key 1 Menu]
     key      - Set authentication key
     delete   - Delete key
     cur      - Display current MD5 key configuration
```

The following table describes the OSPF MD5 Key Configuration Menu options.

Table 142 OSPF MD5 Key Configuration Menu options

Command	Description
key	Sets the authentication key (up to 16 characters) for this OSPF packet.
delete	Deletes the authentication key for this OSPF packet.
cur	Displays the current MD5 key configuration.

IGMP configuration

Command: `/cfg/l3/igmp`

```
[IGMP Menu]
     snoop    - IGMP Snoop Menu
     mrouter  - Static Multicast Router Menu
     igmpflt  - IGMP Filtering Menu
     on       - Globally turn IGMP ON
     off      - Globally turn IGMP OFF
     cur      - Display current IGMP configuration
```

IGMP Snooping allows the switch to forward multicast traffic only to those ports that request it. IGMP Snooping prevents multicast traffic from being flooded to all ports. The switch learns which server hosts are interested in receiving multicast traffic, and forwards it only to ports connected to those servers.

The following table describes the IGMP Menu options.

Table 143 IGMP Snoop Menu options

Command	Description
`snoop`	Displays the IGMP Snoop Menu.
`mrouter`	Displays the Static Multicast Router Menu.
`igmpflt`	Displays the IGMP Filtering Menu.
`on`	Globally turns IGMP on.
`off`	Globally turns IGMP off. This is the default.
`cur`	Displays the current IGMP configuration parameters.

IGMP snooping configuration

Command: `/cfg/l3/igmp/snoop`

```
[IGMP Snoop Menu]
     igmpv3   - IGMP Version3 Snoop Menu
     timeout  - Set report timeout
     mrto     - Set multicast router timeout
     qintrval - Set IGMP query interval
     robust   - Set expected packet loss on subnet
     flood    - Flood unregistered IPMC
     aggr     - Aggregate IGMP report
     srcip    - Set source ip to use when proxying GSQ
     add      - Add VLAN(s) to IGMP Snooping
     rem      - Remove VLAN(s) from IGMP Snooping
     clear    - Remove all VLAN(s) from IGMP Snooping
     fastlv   - Enable/disable Fastleave processing in VLAN
     cur      - Display current IGMP Snooping configuration
```

The following table describes the IGMP Snoop Configuration Menu options.

Table 144 IGMP Snoop Menu options

Command	Description
`igmpv3`	Displays the IGMPv3 Snooping menu.
`timeout <1-255>`	Sets the Maximum Response Time (MRT) for IGMP hosts. MRT is one of the parameters used to determine the age out period of the IGMP hosts. Increasing the timeout increases the age out period. The range is from 1 to 255 seconds. The default is 10 seconds
`mrto <1-600>`	Configures the age-out period for the IGMP Mrouters in the Mrouter table. If the switch does not receive a General Query from the Mrouter for `mrto` seconds, the switch removes the multicast router from its Mrouter table. The range is from 1 to 600 seconds. The default is 255 seconds.
`qintrval <1-600>`	Sets the IGMP router query interval. The range is 1-600 seconds. The default value is 125. seconds
`robust <2-10>`	Configures the IGMP Robustness variable, which allows you to tune the switch for expected packet loss on the subnet. If the subnet is expected to be lossy (high rate of packet loss), then increase the value. The default value is 2.
`flood disable|enable`	Configures the swich to flood unregistered IP multicast reports to all ports.

Table 144 IGMP Snoop Menu options

Command	Description
`aggr disable|enable`	Enables or disables IGMP Membership Report aggregation. The default is enabled.
`srcip <IP address>`	Configures the source IP address used as a proxy for IGMP Group Specific Queries.
`add <1-4094>`	Adds the VLAN to IGMP Snooping.
`rem <1-4094>`	Removes the VLAN from IGMP Snooping.
`clear`	Removes all VLANs from IGMP Snooping.
`fastlv <1-4094> disable|enable`	Enables or disables Fastleave processing. Fastleave allows the switch to immediately remove a port from the IGMP port list, if the host sends a Leave message, and the proper conditions are met. This command is disabled by default.
`ena`	Enables IGMP Snooping.
`dis`	Disables IGMP Snooping. This is the default.
`cur`	Displays the current IGMP Snooping parameters.

IGMPv3 Snooping configuration

Command: `/cfg/l3/igmp/snoop/igmpv3`

```
[IGMP V3 Snoop Menu]
     sources  - Set the number of sources to snoop in group record
     v1v2     - Enable/disable snooping IGMPv1/v2 reports
     exclude  - Enable/disable snooping EXCLUDE mode reports
     ena      - Enable IGMPv3 Snooping
     dis      - Disable IGMPv3 Snooping
     cur      - Display current IGMP Snooping V3 configuration
```

The following table describes the IGMPv3 Snooping Configuration Menu options.

Table 145 IGMPv3 Snooping Menu options

Command	Description
`sources <1-64>`	Configures the maximum number of IGMP multicast sources to snoop from within the group record. The default value is 8.
`v1v2 enable|disable`	Enables or disables snooping on IGMP version 1 and version 2 reports. When disabled, the switch drops IGMPv1 and IGMPv2 reports. The default value is `enabled`.
`exclude enable|disable`	Enables or disables snooping on IGMPv3 Exclude Reports. When disabled, the switch ignores Exclude Reports. The default value is `enabled`.
`ena`	Enables IGMP version 3.
`dis`	Disables IGMP version 3. The default value is **`disabled`**.
`cur`	Displays the current IGMP version 3 parameters.

IGMP static multicast router configuration

Command: `/cfg/l3/igmp/mrouter`

```
[Static Multicast Router Menu]
    add - Add port as Multicast Router Port
    rem - Remove port as Multicast Router Port
    cur - Display current Multicast Router configuration
```

The following table describes the Static Multicast Router Configuration Menu options.

NOTE: When you configure a static multicast router on a VLAN, the process of learning multicast routers is disabled for that VLAN.

Table 146 IGMP Static Multicast Router Menu

Command	Description
`add <port number> <1-4094> <1-3>`	Selects a port/VLAN combination on which the static multicast router is connected, and configures the IGMP version (1 , 2 or 3) of the multicast router
`remove <port number> <1-4094> <1-3>`	Removes a static multicast router from the selected port/VLAN combination.
`cur`	Displays the current IGMP Static Multicast Router parameters.

IGMP filtering configuration

Command: `/cfg/l3/igmp/igmpflt`

```
[IGMP Filter Menu]
   filter - IGMP Filter Definition Menu
   port   - IGMP Filtering Port Menu
   ena    - Enable IGMP Filtering
   dis    - Disable IGMP Filtering
   cur    - Display current IGMP Filtering configuration
```

The following table describes the IGMP Filter Configuration Menu options.

Table 147 IGMP Filtering Menu

Command	Description
`filter <1-16>`	Displays the IGMP Filter Definition Menu.
`port <port number>`	Displays the IGMP Filtering Port Menu.
`ena`	Enables IGMP filtering globally.
`dis`	Disables IGMP Filtering globally. This is the default.
`cur`	Displays the current IGMP Filtering parameters.

IGMP filter definition

Command: `/cfg/l3/igmp/igmpflt/filter`

```
[IGMP Filter 1 Definition Menu]
   range - Set IP Multicast address range
   action - Set filter action
   ena - Enable filter
   dis - Disable filter
   del - Delete filter
   cur - Display current IGMP filter configuration
```

The following table describes the IGMP Filter Definition Menu options.

Table 148 IGMP Filter Definition Menu

Command	Description
`range <IP multicast address> <IP multicast address>`	Configures the range of IP multicast addresses for this filter. Enter the first IP multicast address of the ranger, followed by the second IP multicast address of the range.
`action allow|deny`	Allows or denies multicast traffic for the IP multicast addresses specified.
`ena`	Enables this IGMP filter.
`dis`	Disables this IGMP filter. This is the default.
`del`	Deletes this filter's parameter definitions.
`cur`	Displays the current IGMP filter.

IGMP filtering port configuration

Command: `/cfg/l3/igmp/igmpflt/port`

```
[IGMP Port 18 Menu]
   filt - Enable/disable IGMP Filtering on port
   add  - Add IGMP filter to port
   rem  - Remove IGMP filter from port
   cur  - Display current IGMP Filtering Port configuration
```

The following table describes the IGMP Port Filtering Configuration Menu options.

Table 149 IGMP Filtering Port Menu

Command	Description
`filt enable|disable`	Enables or disables IGMP Filtering on this port. The default is disabled.
`add <1-16>`	Adds an IGMP filter to this port.
`rem <1-16>`	Removes an IGMP filter from this port.
`cur`	Displays the current IGMP filter parameters for this port.

Domain Name System configuration

Command: `/cfg/l3/dns`

```
[Domain Name System Menu]
      prima   - Set primary DNS server address
      secon   - Set secondary DNS server address
      dname   - Set default domain name
      cur     - Display current DNS configuration
```

The Domain Name System (DNS) Configuration Menu is used for defining the primary and secondary DNS servers on your local network, and for setting the default domain name served by the switch services. DNS parameters must be configured prior to using hostname parameters with the **ping, traceroute,** and **tftp** commands.

The following table describes the Domain Name System (DNS) Configuration Menu options.

Table 150 Domain Name System (DNS) Configuration Menu options

Command	Description
`prima <IP address>`	Sets the IP address for your primary DNS server. Use dotted decimal notation. For example, 192.4.17.41
`secon <IP address>`	Sets the IP address for your secondary DNS server. If the primary DNS server fails, the configured secondary will be used instead. Enter the IP address using dotted decimal notation. For example, 192.4.17.42
`dname <dotted DNS notation>|none`	Sets the default domain name used by the switch. For example: `mycompany.com`
`cur`	Displays the current Domain Name System (DNS) settings.

Bootstrap Protocol Relay configuration

Command: `/cfg/l3/bootp`

```
[Bootstrap Protocol Relay Menu]
     addr     - Set IP address of BOOTP server
     addr2    - Set IP address of second BOOTP server
     on       - Globally turn BOOTP relay ON
     off      - Globally turn BOOTP relay OFF
     cur      - Display current BOOTP relay configuration
```

The Bootstrap Protocol (BOOTP) Relay Menu is used to allow hosts to obtain their configurations from a DHCP server. The BOOTP configuration enables the switch to forward a client request for an IP address to two DHCP/BOOTP servers with IP addresses that have been configured on this switch.

BOOTP relay is turned off by default.

The following table describes the BOOTP Configuration Menu options.

Table 151 Bootstrap Protocol Relay Configuration Menu options

Command	Description
`addr <IP address>`	Sets the IP address of the BOOTP server. For example, 100.10.1.1
`addr2 <IP address>`	Sets the IP address of the secondary BOOTP server. For example, 100.10.1.2
`on`	Globally turns on BOOTP relay.
`off`	Globally turns on BOOTP relay. This is the default.
`cur`	Displays the current BOOTP relay configuration.

Virtual Router Redundancy Protocol configuration

Command: `/cfg/l3/vrrp`

```
[Virtual Router Redundancy Protocol Menu]
     vr       - VRRP Virtual Router Menu
     group    - VRRP Virtual Router Group Menu
     if       - VRRP Interface Menu
     track    - VRRP Priority Tracking Menu
     on       - Globally turn VRRP ON
     off      - Globally turn VRRP OFF
     cur      - Display current VRRP configuration
```

Virtual Router Redundancy Protocol (VRRP) support on the switch provides redundancy between routers in a LAN. This is accomplished by configuring the same virtual router IP address and ID number on each participating VRRP-capable routing device. One of the virtual routers is then elected as the master, based on a number of priority criteria, and assumes control of the shared virtual router IP address. If the master fails, one of the backup virtual routers will assume routing authority and take control of the virtual router IP address.

By default, VRRP is disabled. For more information on VRRP, see the "High Availability" chapter in the *N8406-026 10Gb Intelligent L3 Switch Application Guide*.

The following table describes the VRRP Configuration Menu options.

Table 152 VRRP Configuration Menu options

Command	Description
`vr <1-250>`	Displays the VRRP Virtual Router Menu. This menu is used for configuring up to 250 virtual routers on this switch.
`group`	Displays the VRRP virtual router group menu, used to combine all virtual routers together as one logical entity. Group options must be configured when using two or more swiches in a hot-standby failover configuration where only one switch is active at any given time.
`if <1-249>`	Displays the VRRP Virtual Router Interface Menu.
`track`	Displays the VRRP Tracking Menu. This menu is used for weighting the criteria used when modifying priority levels in the master router election process.
`on`	Globally enables VRRP on this switch.
`off`	Globally disables VRRP on this switch. This is the default.
`cur`	Displays the current VRRP parameters.

VRRP Virtual Router configuration

Command: `/cfg/l3/vrrp/vr <1-250>`

```
[VRRP Virtual Router 1 Menu]
     track    - Priority Tracking Menu
     vrid     - Set virtual router ID
     addr     - Set IP address
     if       - Set interface number
     prio     - Set renter priority
     adver    - Set advertisement interval
     preem    - Enable/disable preemption
     ena      - Enable virtual router
     dis      - Disable virtual router
     del      - Delete virtual router
     cur      - Display current VRRP virtual router configuration
```

This menu is used for configuring virtual routers for this switch. A virtual router is defined by its virtual router ID and an IP address. On each VRRP-capable routing device participating in redundancy for this virtual router, a virtual router will be configured to share the same virtual router ID and IP address.

Virtual routers are disabled by default.

The following table describes the Virtual Router Configuration Menu options.

Table 153 VRRP Configuration Menu options

Command	Description
`track`	Displays the VRRP Priority Tracking Menu for this virtual router.
`vrid <1-250>`	Defines the virtual router ID. This is used in conjunction with `addr` (below) to define a virtual router on this switch. To create a pool of VRRP-enabled routing devices which can provide redundancy to each other, each participating VRRP device must be configured with the same virtual router: one that shares the same `vrid` and `addr` combination. The `vrid` for standard virtual routers (where the virtual router IP address is not the same as any virtual server) can be any integer between 1 and 250. The default value is 1. All `vrid` values must be unique within the VLAN to which the virtual router's IP interface belongs.
`addr <IP address>`	Defines the IP address for this virtual router using dotted decimal notation. This is used in conjunction with the `vrid` (above) to configure the same virtual router on each participating VRRP device.
`if <1-249>`	Selects a switch IP interface. If the IP interface has the same IP address as the `addr` option above, this switch is considered the "owner" of the defined virtual router. An owner has a special priority of 255 (highest) and will always assume the role of master router, even if it must preempt another virtual router which has assumed master routing authority. This preemption occurs even if the `preem` option below is disabled. The default value is 1.
`prio <1-254>`	Defines the election priority bias for this virtual server. This can be any integer between 1 and 254. The default value is 100. During the master router election process, the routing device with the highest virtual router priority number wins. If there is a tie, the device with the highest IP interface address wins. If this virtual router's IP address (`addr`) is the same as the one used by the IP interface, the priority for this virtual router will automatically be set to 255 (highest). When priority tracking is used (`/cfg/l3/vrrp/track` or `/cfg/l3/vrrp/vr #/track`), this base priority value can be modified according to a number of performance and operational criteria.
`adver <1-255>`	Defines the time interval between VRRP master advertisements. This can be any integer between 1 and 255 seconds. The default value is 1.
`preem disable|enable`	Enables or disables master preemption. When enabled, if this virtual router is in backup mode but has a higher priority than the current master, this virtual router will preempt the lower priority master and assume control. Note that even when `preem` is disabled, this virtual router will always pre-empt any other master if this switch is the owner (the IP interface address and virtual router `addr` are the same). By default, this option is enabled.
`ena`	Enables this virtual router.
`dis`	Disables this virtual router. This is the default.
`del`	Deletes this virtual router from the switch configuration.
`cur`	Displays the current configuration information for this virtual router.

VRRP Virtual Router Priority Tracking configuration

Command: `/cfg/l3/vrrp/vr <1-250>/track`

```
[VRRP Virtual Router 1 Priority Tracking Menu]
     vrs      - Enable/disable tracking master virtual routers
     ifs      - Enable/disable tracking other interfaces
     ports    - Enable/disable tracking VLAN switch ports
     cur      - Display current VRRP virtual router configuration
```

This menu is used for modifying the priority system used when electing the master router from a pool of virtual routers. Various tracking criteria can be used to bias the election results. Each time one of the tracking criteria is met, the priority level for the virtual router is increased by an amount defined through the VRRP Tracking Menu.

Criteria are tracked dynamically, continuously updating virtual router priority levels when enabled. If the virtual router preemption option is enabled, this virtual router can assume master routing authority when its priority level rises above that of the current master.

The following table describes the Virtual Router Priority Tracking Configuration Menu options.

Table 154 Virtual Router Priority Tracking Configuration Menu options

Command	Description
`vrs disable|enable`	When enabled, the priority for this virtual router will be increased for each virtual router in master mode on this switch. This is useful for making sure that traffic for any particular client/server pairing are handled by the same switch, increasing routing and load balancing efficiency. This command is disabled by default.
`ifs disable|enable`	When enabled, the priority for this virtual router will be increased for each other IP interface active on this switch. An IP interface is considered active when there is at least one active port on the same VLAN. This helps elect the virtual routers with the most available routes as the master. This command is disabled by default.
`ports disable|enable`	When enabled, the priority for this virtual router will be increased for each active port on the same VLAN. A port is considered "active" if it has a link and is forwarding traffic. This helps elect the virtual routers with the most available ports as the master. This command is disabled by default.
`cur`	Displays the current configuration for priority tracking for this virtual router.

VRRP Virtual Router Group configuration

Command: `/cfg/l3/vrrp/group`

```
[VRRP Virtual Router Group Menu]
     track    - Priority Tracking Menu
     vrid     - Set virtual router ID
     if       - Set interface number
     prio     - Set router priority
     adver    - Set advertisement interval
     preem    - Enable/disable preemption
     ena      - Enable virtual router
     dis      - Disable virtual router
     del      - Delete virtual router
     cur      - Display current VRRP virtual router configuration
```

The Virtual Router Group menu is used for associating all virtual routers into a single logical virtual router, which forces all virtual routers on the switch to either be master or backup as a group. A virtual router is defined by its virtual router ID and an IP address. On each VRRP-capable routing device participating in redundancy for this virtual router, a virtual router will be configured to share the same virtual router ID and IP address.

The following table describes the Virtual Router Group Configuration Menu options.

Table 155 Virtual Router Group Configuration Menu options

Command	Description
`track`	Displays the VRRP Priority Tracking Menu for the virtual router group. Tracking is a proprietary extension to VRRP, used for modifying the standard priority system used for electing the master router.
`vrid <1-250>`	Defines the virtual router ID. The `vrid` for standard virtual routers (where the virtual router IP address is not the same as any virtual server) can be any integer between 1 and 250. All `vrid` values must be unique within the VLAN to which the virtual router's IP interface (see `if` below) belongs. The default virtual router ID is 1.
`if <1-249>`	Selects a switch IP interface. The default switch IP interface number is 1.
`prio <1-254>`	Defines the election priority bias for this virtual router group. This can be any integer between 1 and 254. The default value is 100. During the master router election process, the routing device with the highest virtual router priority number wins. If there is a tie, the device with the highest IP interface address wins. If this virtual router's IP address (`addr`) is the same as the one used by the IP interface, the priority for this virtual router will automatically be set to 255 (highest). When priority tracking is used (`/cfg/l3/vrrp/track` or `/cfg/l3/vrrp/vr #/track`), this base priority value can be modified according to a number of performance and operational criteria.
`adver <1-255>`	Defines the time interval between VRRP master advertisements. This can be any integer between 1 and 255 seconds. The default is 1.
`preem disable|enable`	Enables or disables master preemption. When enabled, if the virtual router group is in backup mode but has a higher priority than the current master, this virtual router will preempt the lower priority master and assume control. Note that even when `preem` is disabled, this virtual router will always preempt any other master if this switch is the owner (the IP interface address and virtual router `addr` are the same). By default, this option is enabled.
`ena`	Enables the virtual router group.
`dis`	Disables the virtual router group.
`del`	Deletes the virtual router group from the switch configuration.
`cur`	Displays the current configuration information for the virtual router group.

VRRP Virtual Router Group Priority Tracking configuration

Command: `/cfg/l3/vrrp/group/track`

```
[Virtual Router Group Priority Tracking Menu]
     ifs      - Enable/disable tracking other interfaces
     ports    - Enable/disable tracking VLAN switch ports
     cur      - Display current VRRP Group Tracking configuration
```

NOTE: If *Virtual Router Group Tracking* is enabled, then the tracking option will be available only under *group* option. The tracking setting for the other individual virtual routers will be ignored.

The following table describes the Virtual Router Group Priority Tracking Configuration Menu options.

Table 156 Virtual Router Group Priority Tracking Configuration Menu options

Command	Description
`ifs disable|enable`	When enabled, the priority for this virtual router will be increased for each other IP interface active on this switch. An IP interface is considered active when there is at least one active port on the same VLAN. This helps elect the virtual routers with the most available routes as the master. This command is disabled by default.
`ports disable|enable`	When enabled, the priority for this virtual router will be increased for each active port on the same VLAN. A port is considered "active" if it has a link and is forwarding traffic. This helps elect the virtual routers with the most available ports as the master. This command is disabled by default.
`cur`	Displays the current configuration for priority tracking for this virtual router.

VRRP Interface configuration

Command: `/cfg/l3/vrrp/if <1-249>`

```
[VRRP Interface 1 Menu]
     auth     - Set authentication types
     passw    - Set plain-text password
     del      - Delete interface
     cur      - Display current VRRP interface configuration
```

This menu is used for configuring VRRP authentication parameters for the IP interfaces used with the virtual routers. The *interface-number* represents the IP interface on which authentication parameters must be configured.

The following table describes the VRRP Interface Configuration Menu options.

Table 157 VRRP Interface Configuration Menu options

Command	Description
`auth none|password`	Defines the type of authentication that will be used: `none` (no authentication), or `password` (password authentication). The default is none.
`passw <password>`	Defines a plain text password up to eight characters long. This password will be added to each VRRP packet transmitted by this interface when password authentication is chosen (see **`auth`** above).
`del`	Clears the authentication configuration parameters for this IP interface. The IP interface itself is not deleted.
`cur`	Displays the current configuration for this IP interface's authentication parameters.

VRRP Tracking configuration

Command: `/cfg/l3/vrrp/track`

```
[VRRP Tracking Menu]
     vrs      - Set priority increment for virtual router tracking
     ifs      - Set priority increment for IP interface tracking
     ports    - Set priority increment for VLAN switch port tracking
     cur      - Display current VRRP Priority Tracking configuration
```

This menu is used for setting weights for the various criteria used to modify priority levels during the master router election process. Each time one of the tracking criteria is met, the priority level for the virtual router is increased by an amount defined through this menu.

NOTE: These priority tracking options only define increment values. These options do not affect the VRRP master router election process until options under the VRRP Virtual Router Priority Tracking Menu are enabled.

The following table describes the VRRP Tracking Configuration Menu options.

Table 158 VRRP Tracking Configuration Menu options

Command	Description
`vrs <0-254>`	Defines the priority increment value (0 through 254) for virtual routers in master mode detected on this switch. The default value is 2.
`ifs <0-254>`	Defines the priority increment value (0 through 254) for active IP interfaces detected on this switch. The default value is 2.
`ports <0-254>`	Defines the priority increment value (0 through 254) for active ports on the virtual router's VLAN. The default value is 2.
`cur`	Displays the current configuration of priority tracking increment values.

Quality of Service configuration

Command: `/cfg/qos`

```
[QOS Menu]
     8021p    - 802.1p Menu
```

Use the Quality of Service (QoS) menus to configure the IEEE 802.1p priority value of incoming packets. This allows you to differentiate between various types of traffic, and provide different priority levels. The following table describes the QoS Configuration Menu options.

Table 159 QoS Configuration Menu options

Command	Description
`8021p`	Displays 802.1p configuration menu.

QoS 802.1p configuration

Command: `/cfg/qos/8021p`

```
[802.1p Menu]
     priq     - Set priority to COS queue mapping
     qweight  - Set weight to a COS queue
     numcos   - Set number of COS queue
     default  - Reset 802.1p configuration to default values.
     cur      - Display current 802.1p configuration
```

This feature provides the switch the capability to filter IP packets based on the IEEE 802.1p bits in the packet's VLAN header. The 802.1p bits specify the priority that you should give to the packets while forwarding them. The packets with a higher (non-zero) priority bits are given forwarding preference over packets with numerically lower priority bits value.

The following table describes the 802.1p Configuration Menu options.

Table 160 802.1p Configuration Menu options

Command	Description
`priq <0-7> <0-1>`	Maps the 802.1p priority of to the Class of Service queue (COSq) priority. Enter the 802.1p priority value (0-7); followed by the Class of Service queue (0-1) that handles the matching traffic.
`qweight <0-1> <0-15>`	Configures the weight of the selected Class of Service queue (COSq). Enter the queue number (0-1), followed by the scheduling weight (0-15).
`numcos 2|8`	Sets the number of Class of Service queues for switch ports. The default value is 2.
`default`	Resets 802.1p configuration to default values.
`cur`	Displays the current 802.1p parameters.

Access Control configuration

Command: `/cfg/acl`

```
[ACL Menu]
     acl      - Access Control List Item Config Menu
     group    - Access Control List Group Config Menu
     cur      - Display current ACL configuration
```

Use this menu to create Access Control Lists (ACLs) and ACL Groups. ACLs define matching criteria used for IP filtering and Quality of Service functions.

The following table describes the Access Control Configuration Menu options.

Table 161 Access Control Configuration Menu options

Command	Description
`acl <1-384>`	Displays Access Control List (ACL) configuration menu.
`group <1-384>`	Displays ACL Group configuration menu.
`cur`	Displays the current Access Control parameters.

Access Control List configuration

Command: `/cfg/acl/acl <ACL number>`

```
[ACL 1 Menu]
     ethernet - Ethernet Header Options Menu
     ipv4     - IP Header Options Menu
     tcpudp   - TCP/UDP Header Options Menu
     meter    - ACL Metering Configuration Menu
     re-mark  - ACL Re-mark Configuration Menu
     pktfmt   - Set to filter specific packet format types
     egrport  - Set to filter for packets egressing this port
     action   - Set filter action
     stats    - Enable/disable statistics for this acl
     reset    - Reset filtering parameters
     cur      - Display current filter configuration
```

These menus allow you to define filtering criteria for each Access Control List (ACL). The following table describes the ACL Configuration Menu options.

Table 162 ACL Configuration Menu options

Command	Description
`ethernet`	Displays the ACL Ethernet configuration menu.
`ipv4`	Displays the ACL IP version 4 configuration menu.
`tcpudp`	Displays the ACL TCP/UDP configuration menu.
`meter`	Displays the ACL meter configuration menu.
`re-mark`	Displays the ACL re-mark configuration menu.
`pktfmt`	Displays the ACL Packet Format configuration menu.
`egrport <port number>`	Configures the ACL to function on egress packets. The egress port ACL will not match a Layer 2 broadcast or multicast packet. The egress port ACL will not match packets if the destination port is a trunk.
`action permit|deny|setprio <0-7>`	Configures a filter action for packets that match the ACL definitions. You can choose to permit (pass) or deny (drop) packets, or set the 802.1p priority for the packets.
`stats e|d`	Enables or disables the statistics collection for the Access Control List. The default is disabled.
`reset`	Resets the ACL parameters to their default values and removes the ACL from all ports to which it is assigned.
`cur`	Displays the current ACL parameters.

NOTE: ACL number is available from 1 to 384. ACLs are divided into Precedence Groups. Each Precedence Group provides a different set of packet classifiers for the ACLs within the Precedence Group. See the "Quality of Service" chapter in the *Application Guide*.

ACL Ethernet Filter configuration

Command: `/cfg/acl/acl <ACL number>/ethernet`

```
[Filtering Ethernet Menu]
     smac     - Set to filter on source MAC
     dmac     - Set to filter on destination MAC
     vlan     - Set to filter on VLAN ID
     etype    - Set to filter on ethernet type
     pri      - Set to filter on priority
     reset    - Reset all fields
     cur      - Display current parameters
```

This menu allows you to define Ethernet matching criteria for an ACL. The following table describes the Ethernet Filter Configuration Menu options.

Table 163 Ethernet Filter Configuration Menu options

Command	Description
smac *<MAC address> <MAC mask>*	Defines the source MAC address and MAC mask for this ACL. For example: 00:60:cf:40:56:00 ff:ff:ff:ff:ff:fc
dmac *<MAC address> <MAC mask>*	Defines the destination MAC address and MAC mask for this ACL. For example: 00:60:cf:40:56:00 ff:ff:ff:ff:ff:fc
vlan *<1-4095> <VLAN mask (0xfff)>*	Defines a VLAN number and mask for this ACL.
etype ARP|IP|IPv6|MPLS|RARP|any|0xXXXX	Defines the Ethernet type for this ACL.
pri *<0-7>*	Defines the Ethernet priority value for the ACL.
reset	Resets Ethernet parameters for the ACL to their default values.
cur	Displays the current Ethernet parameters for the ACL.

ACL IP Version 4 Filter configuration

Command: /cfg/acl/acl *<ACL number>*/ipv4

```
[Filtering IPv4 Menu]
     sip      - Set to filter on source IP address
     dip      - Set to filter on destination IP address
     proto    - Set to filter on protocol
     tos      - Set to filter on TOS
     reset    - Reset all fields
     cur      - Display current parameters
```

This menu allows you to define IPv4 matching criteria for an ACL. The following table describes the IP version 4 Filter Configuration Menu options.

Table 164 IPv4 Filter Configuration Menu options

Command	Description
sip *<IP address> <IP mask>*	Defines a source IP address for the ACL.
dip *<IP address> <IP mask>*	Defines a destination IP address for the ACL.
proto *<0-255>*	Defines an IP protocol for the ACL. If defined, traffic from the specified protocol matches this filter. Specify the protocol number. Listed below are some of the well-known protocols. Number Name 1 icmp 2 igmp 6 tcp 17 udp 89 ospf 112 vrrp
tos *<0-255>*	Defines a Type of Service value for the ACL. For more information on ToS, see RFC 1340 and 1349.
reset	Resets the IPv4 parameters for the ACL to their default values.
cur	Displays the current IPV4 parameters.

ACL TCP/UDP Filter configuration

Command: /cfg/acl/acl *<ACL number>*/tcpudp

```
[Filtering TCP/UDP Menu]
     sport    - Set to filter on TCP/UDP source port
     dport    - Set to filter on TCP/UDP destination port
     flags    - Set to filter TCP/UDP flags
     reset    - Reset all fields
     cur      - Display current parameters
```

This menu allows you to define TCP/UDP matching criteria for an ACL. The following table describes the TCP/UDP Filter Configuration Menu options.

Table 165 TCP/UDP Filter Configuration Menu options

Command	Description
`sport <1-65535> <port mask>`	Defines a source port for the ACL. If defined, traffic with the specified TCP or UDP source port will match this ACL. Specify the port number. Listed below are some of the well-known ports: Number Name 20 ftp-data 21 ftp 22 ssh 23 telnet 25 smtp 37 time 42 name 43 whois 53 domain 69 tftp 70 gopher 79 finger 80 http
`dport <1-65535> <port mask>`	Defines a destination port for the ACL. If defined, traffic with the specified TCP or UDP destination port will match this ACL. Specify the port number, just as with `sport` above.
`flags <value (0x0-0x3f)> <mask>`	Defines a TCP/UDP flag for the ACL.
`reset`	Resets the TCP/UDP parameters for the ACL to their default values.
`cur`	Displays the current TCP/UDP Filtering parameters.

ACL Meter configuration

Command: `/cfg/acl/acl <ACL number>/meter`

```
[Metering Menu]
     cir      - Set committed rate in KiloBits/s
     mbsize   - Set maximum burst size in KiloBits
     enable   - Enable/disable port metering
     dpass    - Set to Drop or Pass out of profile traffic
     reset    - Reset meter parameters
     cur      - Display current settings
```

This menu defines the metering profile for the selected ACL.

Table 166 ACL Meter Configuration Menu options

Command	Description
`cir <1000-10000000>`	Configures the committed rate, in Kilobits per second. The committed rate must be a multiple of 1000. The default value is 1000.
`mbsize <32-4096>`	Configures the maximum burst size, in Kilobits. Enter one of the following values for `mbsize`: 32, 64, 128, 256, 512, 1024, 2048, 4096 The default value is 32.
`enable e|d`	Enables or disables metering on the ACL. The default is disabled.
`dpass drop|pass`	Configures the ACL Meter to either drop or pass out-of-profile traffic.
`reset`	Reset ACL Metering parameters to their default values.
`cur`	Displays the current ACL metering parameters.

ACL Re-mark configuration

Command: `/cfg/acl/acl <ACL number>/re-mark`

```
[Re-mark Menu]
     inprof   - In Profile Menu
     outprof  - Out Profile Menu
     reset    - Reset re-mark settings
     cur      - Display current settings
```

You can choose to re-mark IP header data for the selected ACL. You can configure different remark values, based on whether packets fall within the ACL Metering profile, or out of the ACL Metering profile.

Table 167 ACL Re-mark Configuration Menu options

Command	Description
`inprof`	Displays the Re-mark In-Profile Menu.
`outprof`	Displays the Re-mark Out-of-Profile Menu.
`reset`	Reset ACL Re-mark parameters to their default values.
`cur`	Displays the current ACL re-mark parameters.

ACL Re-mark In-Profile configuration

Command: `/cfg/acl/acl <ACL number>/re-mark/inprof`

```
[Re-marking - In Profile Menu]
     up1p     - Set Update User Priority Menu
     updscp   - Set the update DSCP
     reset    - Reset in profile settings
     cur      - Display current settings
```

Table 168 ACL Re-mark In-Profile Configuration Menu options

Command	Description
`up1p`	Displays the Re-Mark In-Profile Update User Priority Menu.
`updscp <0-63>`	Sets the DiffServ Code Point (DSCP) of In-Profile packets to the selected value.
`reset`	Resets the update DSCP parameters to their default values.
`cur`	Displays the current ACL re-mark in-profile parameters.

ACL Re-mark In-Profile Update User Priority configuration

Command: `/cfg/acl/acl <ACL number>/re-mark/inprof/up1p`

```
[Update User Priority Menu]
     value    - Set the update user priority
     utosp    - Enable/Disable use of TOS precedence
     reset    - Reset in profile up1p settings
     cur      - Display current settings
```

Table 169 ACL Update User Priority Configuration Menu options

Command	Description
`value <0-7>`	Defines 802.1p value. The value is the priority bits information in the packet structure.
`utosp enable|disable`	Enable or disable mapping of TOS (Type of Service) priority to 802.1p priority for In-Profile packets. When enabled, the TOS value is used to set the 802.1p value. The default is disabled.
`reset`	Resets UP1P settings to their default values.
`cur`	Displays the current ACL Update User Priority parameters.

ACL Re-mark Out-of-Profile configuration

Command: `/cfg/acl/acl <ACL number>/re-mark/outprof`

```
[Re-marking - Out Of Profile Menu]
     updscp   - Set the update DSCP
     reset    - Reset out of profile settings
     cur      - Display current settings
```

Table 170 ACL Re-mark Out-of-Profile Configuration Menu options

Command	Description
`updscp <0-63>`	Sets the DiffServ Code Point (DSCP) of Out-of-Profile packets to the selected value. The switch sets the DSCP value on Out-of-Profile packets.
`reset`	Resets the update DSCP parameters for Out-of-Profile packets to their default values.
`cur`	Displays the current ACL re-mark out-profile parameters.

ACL Packet Format configuration

Command: `/cfg/acl/acl <ACL number>/pktfmt`

```
[Filtering Packet Format Menu]
     ethfmt   - Set to filter on ethernet format
     tagfmt   - Set to filter on ethernet tagging format
     reset    - Reset all fields
     cur      - Display current parameters
```

The following table describes the Packet Format Configuration Menu options.

Table 171 Packet Format Configuration Menu options

Command	Description
`ethfmt eth2|snap|llc`	Defines the Ethernet format for the ACL.
`tagfmt none|tagged`	Defines the tagging format for the ACL. The default is none.
`reset`	Resets Packet Format parameters for the ACL to their default values.
`cur`	Displays the current Packet Format parameters for the ACL.

ACL Group configuration

Command: `/cfg/acl/group <ACL number>`

```
[ACL Group 1 Menu]
     add      - Add ACL to group
     rem      - Remove ACL from group
     cur      - Display current ACL items in group
```

This menu allows you to compile one or more ACLs into an ACL Group. Once you create an ACL Group, you can assign the ACL Group to one or more ports.

The following table describes the ACL Group Configuration Menu options.

Table 172 ACL Group Configuration Menu options

Command	Description
`add acl <1-384>`	Adds the selected ACL to the ACL Group.
`rem acl<1-384>`	Removes the selected ACL from the ACL Group.
`cur`	Displays the current ACL group parameters.

Remote Monitoring configuration

Command: `/cfg/rmon`

```
[RMON Menu]
      hist    - RMON History Menu
      event   - RMON Event Menu
      alarm   - RMON Alarm Menu
      cur     - Display current RMON configuration
```

Remote Monitoring (RMON) allows you to monitor traffic flowing through the switch. The RMON MIB is described in RFC 1757.

The following table describes the RMON Configuration Menu options.

Table 173 RMON Menu options

Command	Description
`hist`	Displays the RMON History Menu.
`event`	Displays the RMON Event Menu.
`alarm`	Displays the RMON Alarm Menu.
`cur`	Displays the current RMON configuration.

RMON history configuration

Command: `/cfg/rmon/hist <1-65535>`

```
[RMON History 1 Menu]
      ifoid   - Set interface MIB object to monitor
      rbnum   - Set the number of requested buckets
      intrval - Set polling interval
      owner   - Set owner for the RMON group of statistics
      delete  - Delete this history and restore defaults
      cur     - Display current history configuration
```

The switch supports up to five History Groups.

The following table describes the RMON History Menu options.

Table 174 RMON History Menu options

Command	Description
`ifoid <1-127 characters>`	Configures the interface MIB Object Identifier. The IFOID must correspond to the standard interface OID, as follows: 1.3.6.1.2.1.2.2.1.1.x The interface OID can have a maximum of 127 characters.
`rbnum <1-65535>`	Configures the requested number of buckets, which is the number of discrete time intervals over which data is to be saved. The range is from 1 to 65535. The default is 30.
`intrval <1-3600>`	Configures the time interval over which the data is sampled for each bucket. The range is from 1 to 3600 seconds. The default value is 1800 seconds.
`owner <1-127 characters>`	Enter a text string that identifies the person or entity that uses this history index. The owner can have a maximum of 127 characters.
`delete`	Deletes the selected history index.
`cur`	Displays the current RMON History parameters.

RMON event configuration

Command: `/cfg/rmon/event <1-65535>`

```
[RMON Event 1 Menu]
      descn   - Set description for the event
      type    - Set event type
      owner   - Set owner for the event
      delete  - Delete this event and restore defaults
      cur     - Display current event configuration
```

The following table describes the RMON Event Menu options.

Table 175 RMON Event Menu options

Command	Description
`descn <1-127 characters>`	Enter a text string to describe the event. The description can have a maximum of 127 characters.
`type none|log|trap|both`	Selects the type of notification provided for this event. For log events, an entry is made in the log table and sent to the configured syslog host. For trap events, an SNMP trap is sent to the management station.
`owner <1-127 characters>`	Enter a text string that identifies the person or entity that uses this event index. The owner can have a maximum of 127 characters.
`delete`	Deletes this event index.
`cur`	Displays the current RMON Event parameters.

RMON alarm configuration

Command: `/cfg/rmon/alarm <1-65535>`

```
[RMON Alarm 1 Menu]
      oid     - Set MIB oid datasource to monitor
      intrval - Set alarm interval
      sample  - Set sample type
      almtype - Set startup alarm type
      rlimit  - Set rising threshold
      flimit  - Set falling threshold
      revtidx - Set event index to fire on rising threshold crossing
      fevtidx - Set event index to fire on falling threshold crossing
      owner   - Set owner for the alarm
      delete  - Delete this alarm and restore defaults
      cur     - Display current alarm configuration
```

The Alarm RMON group can track rising or falling values for a MIB object. The MIB object must be a counter, gauge, integer, or time interval. Each alarm index must correspond to an event index that triggers once the alarm threshold is crossed. The switch supports up to 30 Alarm Groups.

The following table describes the RMON Alarm Menu options.

Table 176 RMON Alarm Menu options

Command	Description
`oid <1-127 characters>`	Configures an alarm MIB Object Identifier. The alarm OID can have a maximum of 127 characters.
`intrval <1-65535>`	Configures the time interval over which data is sampled and compared with the rising and falling thresholds. The range is from 1 to 65535 seconds. The default is 1800 seconds.
`sample abs|delta`	Configures the method of sampling the selected variable and calculating the value to be compared against the thresholds, as follows: **abs**: absolute value, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. **delta**: delta value, the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds. The default is abs.
`almtype rising|falling|either`	Configures the alarm type as rising, falling, or either (rising or falling). The default is either.
`rlimit < -2147483647 to 2147483647>`	Configures the rising threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. The default value is 0.
`flimit < -2147483647 to 2147483647>`	Configures the falling threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event is generated. The default value is 0.
`revtidx <0-65535>`	Configures the rising alarm event index that is triggered when a rising threshold is crossed. The range is from 0 to 65535. The default value is 0.
`fevtidx <0-65535>`	Configures the falling alarm event index that is triggered when a falling threshold is crossed. The range is from 0 to 65535. The default value is 0.
`owner <1-127 characters>`	Enter a text string that identifies the person or entity that uses this alarm index. The owner can have a maximum of 127 characters.
`delete`	Deletes this alarm index.
`cur`	Displays the current RMON Alarm parameters.

Port mirroring

Command: `/cfg/pmirr`

```
[Port Mirroring Menu]
      mirror  - Enable/Disable Mirroring
      monport - Monitoring Port based PM Menu
      cur     - Display All Mirrored and Monitoring Ports
```

The Port Mirroring Configuration Menu is used to configure, enable, and disable the monitored port. When enabled, network packets being sent and/or received on a target port are duplicated and sent to a monitor port. By attaching a network analyzer to the monitor port, you can collect detailed information about your network performance and usage. Port mirroring is disabled by default.

NOTE: See the "Troubleshooting tools" appendix in the *N8406-026 10Gb Intelligent L3 Switch Application Guide* for information on how to use port mirroring.

The following table describes the Port Mirroring Configuration Menu options.

Table 177 Port Mirroring Configuration Menu options

Command	Description
`mirror disable|enable`	Enables or disables port mirroring. The default is disabled.
`monport <port number>`	Displays port mirroring menu.
`cur`	Displays current settings of the mirrored and monitoring ports.

Port-based port mirroring

Command: `/cfg/pmirr/monport <port number>`

```
[Port 1 Menu]
      add     - Add "Mirrored" port
      rem     - Rem "Mirrored" port
      delete  - Delete this "Monitor" port
      cur     - Display current Port-based Port Mirroring configuration
```

The following table describes the port-based Port Mirroring Configuration Menu options.

Table 178 Port Mirroring Configuration Menu options

Command	Description
`add <mirrored port> in|out|both`	Adds the port to be mirrored. This command also allows you to enter the direction of the traffic. It is necessary to specify the direction because: • If the source port of the frame matches the mirrored port and the mirrored direction is ingress or both (ingress and egress), the frame is sent to the mirrored port. • If the destination port of the frame matches the mirrored port and the mirrored direction is egress or both, the frame is sent to the monitoring port.
`rem <mirrored port>`	Removes the mirrored port.
`delete`	Deletes this monitored port.
`cur`	Displays the current settings of the monitoring port.

Uplink Failure Detection configuration

Command: `/cfg/ufd`

```
[Uplink Failure Detection Menu]
      fdp - Failure Detection Pair Menu
      on  - Globally turn Uplink Failure Detection ON
      off - Globally turn Uplink Failure Detection OFF
      cur - Display current Uplink Failure Detection configuration
```

Uplink Failure Detection (UFD) supports network fault tolerance in network adapter teams. Use this menu to configure Failure Detection Pairs of one Links to Monitor (LtM) group and one Links to Disable (LtD) group. When each UFD is enabled and a Failure Detection Pair is configured, the switch automatically disables ports in the LtD if it detects a failure in the LtM. The failure conditions which are monitored in the LtM group include port link state moving to down, or port state moving to Blocking if Spanning Tree Protocol is enabled.

The following table describes the Uplink Failure Detection (UFD) Configuration Menu options.

Table 179 Uplink Failure Detection Configuration Menu options

Command	Description
`fdp <FDP number>`	Displays the Failure Detection Pair menu.
`on`	Globally turns Uplink Failure Detection ON.
`off`	Globally turns Uplink Failure Detection OFF. This is the default.
`cur`	Displays the current Uplink Failure Detection configuration parameters.

Failure Detection Pair (FDP) configuration

Command: `/cfg/ufd/fdp <FDP number>`

```
[FDP 1 Menu]
      ltm     - Link to Monitor Menu
      ltd     - Link to Disable Menu
      ena     - Enable FDP
      dis     - Disable FDP
      current - Display current FDP configuration
```

Use these commands to configure a Failure Detection Pair, which consists of one Link to Monitor (LtM) and one Link to Disable (LtD). When the switch detects a failure on the LtM, it automatically disables the ports in the LtD.

The following table describes the Failure Detection Pair (FDP) configuration Menu options.

Table 180 Failure Detection Pair Configuration Menu options

Command	Description
`ltm`	Displays the Links to Monitor menu.
`ltd`	Displays the Links to Disable menu.
`ena`	Enables the FDP Parameters.
`dis`	Disables the FDP Parameters. This is the default.
`current`	Displays the current FDP configuration.

Link to Monitor (LtM) configuration

Command: `/cfg/ufd/fdp <FDP number>/ltm`

```
[Failure Link to Monitor Menu]
      addport - Add port to Link to Monitor
      remport - Remove port from Link to Monitor
      addtrnk - Add trunk to Link to Monitor
      remtrnk - Remove trunk from Link to Monitor
      addkey  - Add adminkey to Link to Monitor
      remkey  - Remove adminkey from Link to Monitor
      cur     - Display current LtM configuration
```

The following table describes the Link to Monitor (LtM) Menu options. The LtM can consist of only one uplink port (ports 18-21), a single trunk containing only uplink ports, or a single LACP trunk group containing only uplink ports.

Table 181 Link to Monitor Menu options

Command	Description
`addport <port number>`	Adds a port to the LtM. Only uplink ports (18-21) are allowed in the LtM.
`remport <port number>`	Removes a port from the LtM.
`addtrnk <1-12>`	Adds a trunk group to the LtM. The LtM trunk group can contain only uplink ports (18-21).
`remtrnk <1-12>`	Removes a trunk group from the LtM.
`addkey <LACP port adminkey>`	Adds a LACP trunk group to the LtM. The LtM LACP trunk group can contain only uplink ports (18-21).
`remkey <LACP port adminkey>`	Removes a LACP trunk group from the LtM.
`cur`	Displays the current LtM configuration.

Link to Disable configuration

Command: `/cfg/ufd/fdp <FDP number>/ltd`

```
[Failure Link to Disable Menu]
      addport - Add port to Link to Disable
      remport - Remove port from Link to Disable
      addtrnk - Add trunk to Link to Disable
      remtrnk - Remove trunk from Link to Disable
      addkey  - Add adminkey to Link to Disable
      remkey  - Remove adminkey from Link to Disable
      cur     - Display current LtD configuration
```

The following table describes the Link to Disable (LtD) Menu options. The LtD can consist of any mix of downlink ports (ports 1-16) and trunk groups that contain only downlink ports and LACP trunk groups that contain only downlink ports.

Table 182 Link to Disable Menu options

Command	Description
`addport <port number>`	Adds a port to the current LtD group. Only downlink ports (1-16) are allowed in the LtD.
`remport <port number>`	Removes a port from the current LtD group.
`addtrunk <1-12>`	Adds a trunk group to the current LtD group. LtD trunk groups can contain only downlink ports (1-16).
`remtrunk <1-12>`	Removes a trunk group from the current LtD group.
`addkey <LACP port adminkey>`	Adds a LACP trunk group to the current LtD group. LtD LACP trunk groups can contain only downlink ports (1-16).
`remkey <LACP port adminkey>`	Removes a LACP trunk group from the current LtD group.
`cur`	Displays the current LtD configuration.

Configuration Dump

Command: `/cfg/dump`

The dump program writes the current switch configuration to the terminal screen. To start the dump program, at the **Configuration#** prompt, enter:

```
Configuration# dump
```

The configuration is displayed with parameters that have been changed from the default values. The screen display can be captured, edited, and placed in a script file, which can be used to configure other switches. Paste the configuration commands from the script file at the command line prompt of the switch. The active configuration can also be saved or loaded via FTP/TFTP.

Saving the active switch configuration

Command: `/cfg/ptcfg <FTP/TFTP server> <filename>`

When the **ptcfg** command is used, the active configuration commands of the switch (as displayed using `/cfg/dump`) will be uploaded to the specified script configuration file on the FTP/TFTP server. To start the switch configuration upload, at the **Configuration#** prompt, enter:

```
Configuration# ptcfg <FTP/TFTP server> <filename>
```

Where *<FTP/TFTP server>* is the FTP/TFTP server IP address or hostname and *<filename>* is the name of the target script configuration file.

Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

NOTE: The output file is formatted with line-breaks but no carriage returns. The file cannot be viewed with editors that require carriage returns (such as Microsoft Notepad).

NOTE: If the FTP/TFTP server is running SunOS™ or the Solaris™ operating system, the specified **ptcfg** file must exist prior to executing the **ptcfg** command and must be writable (set with proper permission, and not locked by any application). The contents of the specified file will be replaced with the current configuration data.

Restoring the active switch configuration

Command: `/cfg/gtcfg <FTP/TFTP server> <filename>`

When the **gtcfg** command is used, the active configuration will be replaced with the commands found in the specified configuration file. The file can contain a full switch configuration or a partial configuration. The configuration loaded using **gtcfg** is not activated until the **apply** command is used. If the **apply** command is found in the configuration script file loaded using this command, the apply action will be performed automatically.

To start the switch configuration download, at the **Configuration#** prompt, enter:

```
Configuration#  gtcfg <FTP/TFTP server> <filename>
```

Where *<FTP/TFTP server>* is the FTP/TFTP server IP address or hostname and *<filename>* is the name of the target script configuration file.

Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

NOTE: The switch supports three configuration files: active, backup, and factory. See the "Selecting a configuration block" section in the "Boot Options Menu" chapter for information on how to set which configuration file to use upon boot up.

Operations Menu

Introduction

Operations-level commands are used for making immediate and temporary changes to switch configuration. The Operations Menu is used for bringing ports temporarily in and out of service. This menu is available only from an administrator and operator login.

Menu information

Command: `/oper`

```
[Operations Menu]
     port     - Operational Port Menu
     vrrp     - Operational Virtual Router Redundancy Menu
     passwd   - Change current user password
     clrlog   - Clear syslog messages
     tnetsshc - Close all telnet/ssh connections.
     ntpreq   - Send NTP request
```

The following table describes the Operations Menu options.

Table 183 Operations Menu options

Command	Description
`port <port number>`	Displays the Operational Port Menu.
`Vrrp`	Displays the Operational Virtual Router Redundancy Menu.
`passwd <1-128 characters>`	Allows the user to change the password. You need to enter the current password in use for validation.
`clrlog`	Clears all Syslog messages. This command is available only from an administrator login.
`tnetsshc`	Close all telnet and ssh connections.
`ntpreq`	Allows the user to send requests to the NTP server. This command is available only from an administrator login.

Operations-level port options

Command: `/oper/port <port number>`

```
[Operations Port 1 Menu]
     8021x    - 8021.x Menu
     rmon     - Enable/Disable RMON for port
     ena      - Enable port
     dis      - Disable port
     cur      - Current port state
```

Operations-level port options are used for temporarily disabling or enabling a port.

Table 184 Operations-Level Port Menu options

Command	Description
`8021x`	Displays the 802.1x Port Menu. This menu is available only from an administrator login.
`rmon disable|enable`	Enables or disables Remote Monitoring for the port. RMON must be enabled for any RMON configurations to function.
`ena`	Temporarily enables the port. The port will be returned to its configured operation mode when the switch is reset. **NOTE**: This command does not enable a port that has been disabled by an ekeying mismatch error.
`dis`	Temporarily disables the port. The port will be returned to its configured operation mode when the switch is reset.
`cur`	Displays the current settings for the port.

Operations-level port 802.1x options

Command: `/oper/port <port number>/8021x`

```
[802.1x Operation Menu]
     reset    - Reinitialize 802.1x access control on this port
     reauth   - Initiate reauthentication on this port now
```

Operations-level port 802.1x options are used to temporarily set 802.1x parameters for a port. This menu is available only from an administrator login.

Table 185 Operations-Level Port 802.1x Menu options

Command	Description
`reset`	Re-initializes the 802.1x access-control parameters for the port. The following actions take place, depending on the 802.1x port configuration: • **`force unauth`** - the port is placed in unauthorized state, and traffic is blocked. • **`auto`** - the port is placed in unauthorized state, then authentication is initiated. • **`force auth`** - the port is placed in authorized state, and authentication is not required.
`reauth`	Re-authenticates the supplicant (client) attached to the port. This command only applies if the port's 802.1x mode is configured as `auto`.

Operations-level VRRP options

Command: `/oper/vrrp`

```
[VRRP Operations Menu]
     back     - Set virtual router to backup
```

Operations-level VRRP options are described in the following table.

Table 186 Operations-Level VRRP Menu options

Command	Description
`back <1-250>`	Forces the specified master virtual router on this switch into backup mode. This is generally used for passing master control back to a preferred switch once the preferred switch has been returned to service after a failure. When this command is executed, the current master gives up control and initiates a new election by temporarily advertising its own priority level as 0 (lowest). After the new election, the virtual router forced into backup mode by this command will resume master control in the following cases: • This switch owns the virtual router (the IP addresses of the virtual router and its IP interface are the same) • This switch's virtual router has a higher priority and preemption is enabled. • There are no other virtual routers available to take master control.

Boot Options Menu

Introduction

You must be logged in to the switch as the administrator to use the Boot Options Menu.

The Boot Options Menu provides options for:

- Selecting a switch software image to be used when the switch is next reset.
- Selecting a configuration block to be used when the switch is next reset.
- Downloading or uploading a new software image to the switch via FTP/TFTP.

Menu information

Command: `/boot`

```
[Boot Options Menu]
       image  - Select software image to use on next boot
       conf   - Select config block to use on next boot
       mode   - Select CLI mode to use on next boot
       prompt - Prompt for selectable CLI boot mode
       gtimg  - Download new software image via FTP/TFTP
       ptimg  - Upload selected software image via FTP/TFTP
       reset  - Reset switch [WARNING: Restarts Spanning Tree]
       cur    - Display current boot options
```

Each of the Boot Options Menu commands is discussed in greater detail in the following sections.

Updating the switch software image

The switch software image is the executable code running on the switch. A version of the image ships with the switch, and comes pre-installed on the device. As new versions of the image are released, you can upgrade the software running on the switch.

Upgrading the software image on the switch requires the following:

- Loading the new image onto a FTP/TFTP server on your network
- Downloading the new image from the FTP/TFTP server to the switch
- Selecting the new software image to be loaded into switch memory the next time the switch is reset

Downloading new software to the switch

The switch can store up to two different software images, called **image1** and **image2**, as well as boot software, called **boot**. When you download new software, you must specify where it should be placed: either into **image1**, **image2**, or **boot**.

For example, if your active image is currently loaded into **image1**, you would probably load the new image software into **image2**. This lets you test the new software and reload the original active image (stored in **image1**), if needed.

To download new software to the switch, you will need the following:

- The image or boot software loaded on a FTP or TFTP server on your network
- The hostname or IP address of the FTP or TFTP server
- The user name and password for FTP server, if necessary
- The name of the new software image or boot file

NOTE: The DNS parameters must be configured if specifying hostnames. See the "Domain name system configuration" section in the "Configuration Menu" chapter.

When the above requirements are met, use the following procedure to download the new software to the switch.

1. At the Boot Options# prompt, enter:

```
Boot Options# gtimg
```

2. Enter the name of the switch software to be replaced:

```
Enter name of switch software image to be replaced
 ["image1"/"image2"/"boot"]: <image>
```

3. Enter the hostname or IP address of the FTP or TFTP server:

```
Enter hostname or IP address of FTP/TFTP server: <server name or IP
address>
```

4. Enter the name of the new software file on the server:

```
Enter name of file on FTP/TFTP server: <filename>
```

The exact form of the name will vary by TFTP server. However, the file location is normally relative to the TFTP directory.

5. Enter the username, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

6. Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

7. Enter the port type to use for the file transfer:

```
Enter the port to use for downloading the image
["mgt"|"data"]:
```

8. The system prompts you to confirm your request.

You should next select a software image to run, as described in the "Selecting a Soft Image to Run" section.

9. If you are loading an image from which you are not currently booted, the system prompts you to change the image.

```
image2 currently contains Software Version 1.0.0
 that was downloaded at 15:46:36 Wed Apr 23, 2006.
New download will replace image2 with file "1.0.1_OS.img"
 from TFTP server 192.168.2.4.
Confirm download operation [y/n]: y
Invoking TFTP over port 69...
Starting download...
File appears valid
Download in
progress.................................................
Image download complete (1333953 bytes)
Writing to flash...This takes about 90 seconds. Please wait
Write complete (1333953 bytes), now verifying FLASH...
Verification of new image2 in FLASH successful.
image2 now contains Software Version 1.0.1
Switch is currently set to boot software image1.
Do you want to change that to the new image2? [y/n] y
Next boot will use new software image2.
```

Selecting a software image to run

You can select which software image (**image1** or **image2**) you want to run in switch memory for the next reboot.

1. At the Boot Options# prompt, enter:

```
Boot Options# image
```

2. Enter the name of the image you want the switch to use upon the next boot. The system informs you of which image is currently set to be loaded at the next reset, and prompts you to enter a new choice:

```
Currently set to use switch software "image1" on next reset.

Specify new image to use on next reset ["image1"/"image2"]:
```

Uploading a software image from the switch

You can upload a software image from the switch to a FTP or TFTP server.

1. At the Boot Options# prompt, enter:

```
Boot Options# ptimg
```

2. The system prompts you for information. Enter the desired image:

```
Enter name of switch software image to be uploaded
["image1"|"image2"|"boot"]: <image>
```

3. Enter the name or the IP address of the FTP or TFTP server:

```
Enter hostname or IP address of FTP/TFTP server: <server name or IP
address>
```

4. Enter the name of the file into which the image will be uploaded on the FTP or TFTP server:

```
Enter name of file on FTP/TFTP server: <filename>
```

5. Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

6. Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

7. The system then requests confirmation of what you have entered. To have the file uploaded, enter "y".

```
image2 currently contains Software Version 1.0.0
Upload will transfer image2 (1889411 bytes) to file "test"
 on TFTP server 192.1.1.1.
Confirm upload operation [y/n]: y
```

Selecting a configuration block

When you make configuration changes to the switch, you must save the changes so that they are retained beyond the next time the switch is reset. When you execute the **save** command, your new configuration changes are placed in the active configuration block. The previous configuration is copied into the backup configuration block.

There is also a factory configuration block. This holds the default configuration set by the factory when the switch was manufactured. Under certain circumstances, it may be desirable to reset the switch configuration to the default. This can be useful when a custom-configured switch is moved to a network environment where it will be re-configured for a different purpose.

Use the following procedure to set which configuration block you want the switch to load the next time it is reset:

1. At the Boot Options# prompt, enter:

```
Boot Options# conf
```

2. Enter the name of the configuration block you want the switch to use.

The system indicates which configuration block is currently set to be loaded at the next reset, and prompts you to enter a new choice:

```
Currently set to use active configuration block on next reset.
Specify new block to use ["active"/"backup"/"factory"]:
```

Resetting the switch

You can reset the switch to make your software image file and configuration block changes occur.

Resetting the switch causes the Spanning Tree Protocol to restart. This process can be lengthy, depending on the topology of your network.

To reset the switch, at the Boot Options# prompt, enter:

```
>> Boot Options# reset
```

You are prompted to confirm your request.

To display current boot options, enter:

```
>> Boot Options# cur
```

Accessing the ISCLI

To access the ISCLI, enter the following command from the AOS CLI, and reset the switch:

```
Boot Options# mode iscli
```

The default command-line interface for this switch is the AOS CLI. To access the AOS CLI, enter the following command and reset this switch:

```
>> Switch# boot cli-mode aos
```

Users can select the CLI mode upon login, if the `/boot/prompt` command is enabled. Only an administrator connected through the console port can view and enable `/boot/prompt`. When `/boot/prompt` is enabled, the first user to log in can select either the CLI mode. Subsequent users must use the selected CLI mode, until all users have logged out.

Maintenance Menu

Introduction

The Maintenance Menu is used for debugging purposes, enabling you to generate a technical support dump of the critical state information in the switch, and to clear entries in the Forwarding Database (FDB) and the Address Resolution Protocol (ARP) and routing tables. This menu is available only from an administrator and operator login.

Menu information

Command: `/maint`

```
[Maintenance Menu]
      sys     - System Maintenance Menu
      fdb     - Forwarding Database Manipulation Menu
      debug   - Debugging Menu
      arp     - ARP Cache Manipulation Menu
      route   - IP Route Manipulation Menu
      igmp    - IGMP Multicast Group Menu
      uudmp   - Uuencode FLASH dump
      ptdmp   - Upload FLASH dump via FTP/TFTP
      ptfile  - Upload FLASH dump via FTP/TFTP
      cldmp   - Clear FLASH dump
      panic   - Dump state information to FLASH and reboot
      tsdmp   - Tech support dump
      pttsdmp - Upload tech support dump via FTP/TFTP
```

Dump information contains internal switch state data that is written to flash memory on the switch after any one of the following occurs:

- The switch administrator forces a switch panic. The panic option, found in the Maintenance Menu, causes the switch to dump state information to flash memory, and then causes the switch to reboot.
- The switch administrator enters the switch reset key combination (`Ctrl-Shift-6`) on a device that is attached to the console port.
- The switch detects a hardware or software problem that requires a reboot.

The following table describes the Maintenance Menu options.

Table 187 Maintenance Menu options

Command	Usage
`sys`	Displays the System Maintenance Menu.
`fdb`	Displays the Forwarding Database (FDB) Manipulation Menu.
`debug`	Displays the Debug Menu.
`arp`	Displays the ARP Cache Manipulation Menu.
`route`	Displays the IP Route Manipulation Menu.
`igmp`	Displays the IGMP Maintenance Menu.
`uudmp`	Displays dump information in uuencoded format.
`ptdmp`	Saves the system dump information via FTP/TFTP.
`ptfile`	Saves a specified file from the switch root file system to an FTP/TFTP server.
`cldmp`	Clears dump information from flash memory.
`panic`	Dumps MP information to flash and reboots.
`tsdmp`	Dumps all switch information, statistics, and configuration.
`pttsdmp`	Redirects the technical support dump (tsdmp) to an external TFTP server.

System maintenance options

Command: `/maint/sys`

```
[System Maintenance Menu]
      flags   - Set NVRAM flag word
      tmask   - Set MP trace mask word
```

The System Maintenance Menu is reserved for use by NEC technical support. The options are used to perform system debugging.

The following table describes the System Maintenance Menu options.

Table 188 System Maintenance Menu options

Command	Usage
`flags <new NVRAM flags word as 0xXXXXXXXX>`	Sets the flags that are used for debugging purposes by NEC technical support.
`tmask`	Sets the tracemask

Forwarding Database options

Command: `/maint/fdb`

```
[FDB Manipulation Menu]
      find    - Show a single FDB entry by MAC address
      port    - Show FDB entries for a single port
      vlan    - Show FDB entries for a single VLAN
      dump    - Show all FDB entries
      clear   - Clear entire FDB, then re-add static entries
```

FDB (The Forwarding Database) Manipulation Menu can be used to view information and to delete a MAC address from the Forwarding Database or clear the entire Forwarding Database. This is helpful in identifying problems associated with MAC address learning and packet forwarding decisions.

The following table describes the FDB Manipulation Menu options.

Table 189 FDB Manipulation Menu options

Command	Usage
`find <MAC address> [<1-4094>]`	Displays a single database entry by its MAC address. You are prompted to enter the MAC address of the device. Enter the MAC address using one of the following: • xx:xx:xx:xx:xx:xx format (for example: 08:00:20:12:34:56) • xxxxxxxxxxxx format (for example: 080020123456).
`port <port number>`	Displays all FDB entries for a particular port.
`vlan <1-4094>`	Displays all FDB entries on a single VLAN.
`dump`	Displays all entries in the Forwarding Database.
`clear`	Clears the entire Forwarding Database from switch memory, then adds the static entries to the Forwarding Database.

Debugging options

Command: `/maint/debug`

```
[Miscellaneous Debug Menu]
      tbuf    - Show MP trace buffer
      snap    - Show MP snap (or post-mortem) trace buffer
      clrcfg  - Clear all flash configs
```

The Miscellaneous Debug Menu displays trace buffer information about events that can be helpful in understanding switch operation. You can view the following information using the Debug Menu:

- Events traced by the management processor (MP)
- Events traced to a buffer area when a reset occurs

If the switch resets for any reason, the management processor (MP) trace buffer is saved into the snap trace buffer area.

The following table describes the Miscellaneous Debug Menu options:

Table 190 Miscellaneous Debug Menu options

Command	Usage
`tbuf`	Displays the management processor trace buffer. Header information similar to the following is shown: MP trace buffer at 13:28:15 Fri May 25, 2002; mask: 0x2ffdf748 The buffer information is displayed after the header.
`snap`	Displays the management processor snap (or post-mortem) trace buffer. This buffer contains information traced at the time that a reset occurred.
`clrcfg`	Deletes all flash configuration blocks. The next time the switch is rebooted, it returns to the factory default settings.

ARP cache options

Command: `/maint/arp`

```
[Address Resolution Protocol Menu]
      find    - Show a single ARP entry by IP address
      port    - Show ARP entries on a single port
      vlan    - Show ARP entries on a single VLAN
      addr    - Show ARP entries for switch's interfaces
      dump    - Show all ARP entries
      clear   - Clear ARP cache
```

The following table describes the Address Resolution Protocol Menu options:

Table 191 Address Resolution Protocol Menu options

Command	Usage
`find <IP address>`	Shows a single ARP entry by IP address.
`port <port number>`	Shows ARP entries on a single port.
`vlan <1-4094>`	Shows ARP entries on a single VLAN.
`addr`	Shows the list of IP addresses that the switch will respond to for ARP requests.
`dump`	Shows all ARP entries.
`clear`	Clears the entire ARP list from switch memory.

NOTE: To display all ARP entries currently held in the switch, or a portion according to one of the options listed on the menu above (**find, port, vlan, dump**), see the "ARP information" section of the "Information Menu" chapter.

IP Route Manipulation options

Command: `/maint/route`

```
[IP Routing Menu]
     find     - Show a single route by destination IP address
     gw       - Show routes to a single gateway
     type     - Show routes of a single type
     tag      - Show routes of a single tag
     if       - Show routes on a single interface
     dump     - Show all routes
     clear    - Clear route table
```

The following table describes the IP Route Manipulation Menu options:

Table 192 IP Route Manipulation Menu options

Command	Usage
`find <IP address>`	Shows a single route by destination IP address.
`gw <IP address>`	Shows routes to a default gateway.
`type indirect|direct|local|broadcast|martian |multicast`	Shows routes of a single type.
`tag fixed|static|addr|rip|ospf| broadcast|martian`	Shows routes of a single tag.
`if <1-256>`	Shows routes on a single interface.
`dump`	Shows all routes.
`clear`	Clears the route table from switch memory.

IGMP Multicast Group options

Command: `/maint/igmp`

```
[IGMP Multicast Group Menu]
     snoop    - IGMP Snooping Menu
     mrouter  - IGMP Multicast Router Port Menu
     clear    - Clear group and mrouter tables
```

The following table describes the IGMP Multicast Group Maintenance Menu options.

Table 193 IGMP Multicast Group Menu options

Command	Usage
`snoop`	Displays the IGMP Snooping maintenance menu.
`mrouter`	Displays the IGMP Multicast Router maintenance menu.
`clear`	Clears IGMP Multicast data from switch memory.

IGMP Snooping options

Command: `/maint/igmp/snoop`

```
[IGMP Multicast Group Menu]
     find     - Show a single group by IP group address
     vlan     - Show groups on a single vlan
     port     - Show groups on a single port
     trunk    - Show groups on a single trunk
     detail   - Show detail of a single group by IP address
     dump     - Show all groups
     clear    - Clear group tables
```

The following table describes the IGMP Snoop Maintenance Menu options.

Table 194 IGMP Snooping Menu options

Command	Usage
`find <IP address>`	Shows a single IGMP Multicast group by IP address.
`vlan <1-4094>`	Shows IGMP Multicast groups on a single VLAN.
`port <port number>`	Shows IGMP Multicast groups on a single port.
`trunk <1-40>`	Displays all IGMP multicast groups on a single trunk group. (To be added-LACP trunks)
`detail <IP address>`	Displays details about IGMP muticast groups.
`dump`	Shows all IGMP Multicast groups.
`clear`	Clears IGMP Multicast data from switch memory.

IGMP Mrulticast Routers options

Command: `/maint/igmp/mrouter`

```
[IGMP Multicast Routers Menu]
     vlan     - Show all multicast router ports on a single vlan
     dump     - Show all multicast router ports
     clear    - Clear multicast router port table
```

The following table describes the IGMP Multicast Routers Maintenance Menu options.

Table 195 IGMP Multicast Group Menu options

Command	Usage
`vlan <1-4094>`	Shows IGMP Multicast groups on a single VLAN.
`dump`	Shows all IGMP Multicast routers.
`clear`	Clears IGMP Multicast router data from switch memory.

Technical support dump

Command: `/maint/tsdmp`

Use this command to dump all switch information, statistics, and configuration.

If you want to capture dump information to a file, set your communication software on your workstation to capture session data prior to issuing the tsdmp command.

FTP/TFTP technical support dump put

Command: `/maint/pttsdmp`

Use this command to put (save) the technical support dump to a FTP/TFTP server.

Uuencode flash dump

Command: `/maint/uudmp`

Using this command, dump information is presented in uuencoded format. This format makes it easy to capture the dump information as a file or a string of characters.

If you want to capture dump information to a file, set your communication software on your workstation to capture session data prior to issuing the **uudmp** command. This will ensure that you do not lose any information. Once entered, the **uudmp** command will cause approximately 23,300 lines of data to be displayed on your screen and copied into the file.

Using the **uudmp** command, dump information can be read multiple times. The command does not cause the information to be updated or cleared from flash memory.

Dump information is not cleared automatically. In order for any subsequent dump information to be written to flash memory, you must manually clear the dump region. For more information on clearing the dump region, see the "Clearing dump information" section later in this chapter.

To access dump information, at the Maintenance# prompt, enter:

```
Maintenance# uudmp
```

The dump information is displayed on your screen and, if you have configured your communication software to do so, captured to a file. If the dump region is empty, the following displays:

```
No FLASH dump available.
```

FTP/TFTP system dump put

Command: `/maint/ptdmp <server> <filename>`

Use this command to put (save) the system dump to a FTP/TFTP server.

NOTE: If the FTP/TFTP server is running SunOS or the Solaris operating system, the specified **ptdmp** file must exist prior to executing the **ptdmp** command, and must be writable (set with proper permission, and not locked by any application). The contents of the specified file will be replaced with the current dump data.

To save dump information via FTP/TFTP, at the Maintenance# prompt, enter:

```
Maintenance#  ptdmp <server> <filename>
```

Type the FTP/TFTP server IP address or hostname as <*server*>, and the target dump file as <*filename*>.

Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

Clearing dump information

Command: `/maint/cldmp`

To clear dump information from flash memory, at the Maintenance# prompt, enter:

```
Maintenance# cldmp
```

The switch clears the dump region of flash memory and displays the following message:

```
FLASH dump region cleared.
```

If the flash dump region is already clear, the switch displays the following message:

```
FLASH dump region is already clear.
```

Panic command

Command: `/maint/panic`

The panic command causes the switch to immediately dump state information to flash memory and automatically reboot.

To select panic, at the Maintenance# prompt, enter:

```
>> Maintenance# panic
A FLASH dump already exists.
Confirm replacing existing dump and reboot [y/n]:
```

Enter "y" to confirm the command:

```
Confirm dump and reboot [y/n]: y
```

A list of messages is displayed:

```
Starting system dump...done.

Reboot at 11:54:08 Wednesday October 30, 2005...

. . . . . .

. . . . . .

Rebooted because of console PANIC command.

Booting complete
```

Unscheduled system dumps

If there is an unscheduled system dump to flash memory, the following message is displayed when you log on to the switch:

```
Note: A system dump exists in FLASH. The dump was saved
      at 13:43:22 Wednesday October 30, 2005. Use /maint/uudmp to
      extract the dump for analysis and /maint/cldmp to
      clear the FLASH region. The region must be cleared
      before another dump can be saved.
```